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THE CANADIAN

ENTOMOLOGIST.

VOLUME VI.

Edited by W. Saunders,

LONDON, ONT.

ASSISTED BY

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EDITORIAL.

In accordance with a time honoured custom, we heartily tender to all our readers in this, the opening number of a new volume, the compliments of the season—a happy and a prosperous new year. It is meet at these annually recurring points in the history of our journal that we should briefly review the past, believing as we do that a recalling to mind the advances we have made and the encouraging success which has attended our efforts thus far will stimulate us to renewed exertion and make us hopeful and trustful for the future. Five years ago the CANADIAN ENTOMOLOGIST made its first appearance as a small eight paged magazine. Our members were scarcely sanguine enough to hope for a regular monthly issue even of this size, so in the opening number its appearance was promised occasionally, as material should accumulate; but our success has been beyond our expectations, the issue of our journal has been tolerably regular up to the present time: we have gradually increased its size from eight to twenty pages; have risen from common white paper to finely finished toned paper, have embellished our pages with many beautiful wood-cuts, and have presented to our readers from time to time Entomological matter in such variety as we trust will have met the views and wishes of all those who have favored us with their patronage. The work which our late esteemed Editor has so successfully carried on we shall, with his assistance and that of our other coadjutors, endeavour to continue.

To those who have aided us by their valuable contributions to our pages we are especially grateful, and we sincerely hope for a continuance of these esteemed favors. Pressed as we are with a burden of other work, we trust our friends will continue to forward their papers without waiting for personal solicitation. We propose to continue the monthly articles on our common insects, and also to furnish such gleanings in our

summary as we think will interest the general reader, while at the same time we shall endeavour to maintain for our journal that scientific standing which gives it value in the eyes of so many of our co-laborers in the Entomological field.

We feel persuaded that our readers will not overlook the fact that this festive season is the time also for renewing their subscriptions; money is a motive power in our operations which we cannot overlook. This gentle hint will no doubt be heartily responded to, and we trust that while our members bear in mind their own liabilities in this matter, they will also try to induce as many of their friends as possible to join our ranks, so that the circulation of the ENTOMOLOGIST may be greatly increased.

ON SOME OF OUR COMMON INSECTS.

II. *THE TIGER SWALLOW TAIL—Papilio turnus*, Linn.

BY THE EDITOR.

All our readers must have seen the large tiger swallow tail butterfly floating about in the warm days of July and August, enjoying the

Fig. 1.

sunshine and sipping the honey from flowers. It is among our largest and handsomest butterflies. In figure 1 we have an excellent represen-

tation of it. When its wings are expanded this insect will measure about four inches across. The ground color of its wings is a pale lemon yellow, which is banded and bordered with black ; on the fore wings are four black bars, the inner one extending entirely across the wing, the outer ones shortening more and more as they approach the apex. The front margin is edged with black, and the outer margin has a wide border of the same in which is set a row of eight or nine pale yellow spots, the lower ones less distinct.

The hind wings are crossed by a streak of black which is almost a continuation of the inner band on the fore wings ; there is a short black streak a little beyond at the end of the discal cell, and a wide black border widening as it approaches the inner angle of the wing. Enclosed within this border and towards its outer edge are six lunular spots, the upper and lower ones reddish, the others yellow ; above and about these spots and especially towards the inner angle of the wing, the black bordering is thickly powdered with blue scales. The outer margin of the hind wings is scalloped and partly edged with yellow ; the inner margin is bordered with dusky for about two-thirds of its length, followed by a small yellow patch, which in turn is succeeded by a larger black spot centered with a crescent of blue atoms and bounded below by an irregular reddish spot margined within with yellow. The hind wings terminate in two long black tails, edged on the inside with yellow. The body is black above, margined with pale yellowish ; below yellowish streaked with black.

The under surface of the wings somewhat resembles the upper, but is paler.

This species passes the winter in the chrysalis state, and appears first on the wing from the middle to the latter end of May, but becomes much more plentiful during July. Whether these July insects are a second brood, or whether the bulk of the chrysalids which have wintered do not mature until about this time we are unable to determine ; individuals which we have wintered over have escaped from chrysalis as late as the 3rd of June.

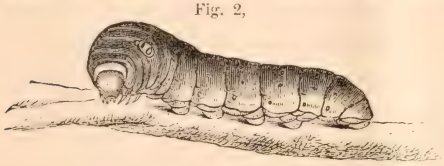
The eggs of *turnus* are deposited singly on the leaves of the different plants or trees on which the larva feeds. They are between one-twentieth and one-twenty-fifth of an inch in diameter, sub-globular, flattened at the place of attachment ; colour dark green, surface smooth, without reticulations, but showing a few small irregularly distributed spots under

a magnifying power of forty-five diameters. In about ten or twelve days they begin to change colour, becoming darker, and very dark just before the young larvæ are hatched.

When fresh from the egg the larva is about one-tenth of an inch long, with a large black head and with a black body roughened with small brownish black tubercles. The second segment is elevated or thickened and of a dull glossy flesh colour, with a prominent fleshy tubercle on each side and a patch of white on the seventh and eighth segments, wide anteriorly, pointed behind ; there is also a dull flesh coloured streak along the back on fourth and eleventh segments. The twelfth segment has a pair of fleshy tubercles rather prominent, but not so large as those on the second ; both those on the second and twelfth have several short whitish hairs arising from them. The under surface is brownish black, with the feet and prolegs of the same colour.

The full grown larva, see figure 2, taken July 14th, measured one and a half inches in length. Its head is rather large and of a reddish brown colour, sprinkled with very short white hairs.

Fig. 2,



The body above, green, of a slightly darker shade on the anterior segments, paler on the sides of the body, over which there is a whitish bloom produced by a multitude of very minute white dots, with small short hairs of the same colour issuing from them ; the anterior segments of the body are wrinkled. On the front edge of the second segment is a raised yellow fold slightly overhanging the head, and on each side of the fourth segment is an eye-like spot, nearly oval in shape, yellow, encircled with a ring of black, centered with a small elongated blue dot, which is also set in black and has above it on each side a black line nearly crossing the yellow spot. On the hinder portion of the fifth segment is a raised yellow fold, bordered behind with rich velvety black, the latter visible only when the larva is in motion ; on the terminal segment is a similar fold flattened above, with a slight protuberance on each side. On the fifth segment, in front of the yellow fold, are two blue dots, one on each side of the dorsal line ; there are also faint traces on the hinder segments of a continuation of these dots in longitudinal rows.

The under surface is of a paler green than the upper, with a whitish bloom ; prolegs of the same colour, feet tipped with brown.

As the larva approaches maturity and is about to change to a chrysalis, the colour of the body gradually grows darker until it becomes dark reddish brown, the sides nearly black. The minute whitish granulations and the blue dots become much more distinctly visible, giving the larva a very different appearance. It then selects some suitable spot in which to pass the chrysalis state, where it spins a web of silk in which its hind feet are entangled, and having prepared and stretched across a silken band to sustain its body in the middle, it casts its larva skin and remains a dull brownish chrysalis until the following spring.

This insect is widely distributed, being found throughout the greater portion of the United States and Canada. The larva feeds on a number of different trees, but chiefly affects with us the apple, cherry, thorn and basswood.

THE USE OF APHIS-EXCRETION AND BENEFIT DERIVED THEREFROM.

BY THOMAS G. GENTRY, GERMANTOWN, PA.

It is well known to the popular as well as scientific world that the *Aphides* secrete or rather excrete a peculiarly viscid and honey-like fluid which forms one of the chief delicacies of Ants. That it was originally designed to form an article of food for the latter is a supposition that cannot be entertained for a single moment; but that it is in some way connected with the preservation of the soft and tender beings by which it is manufactured, there can be no reasonable doubt. Various opinions have been hazarded, and not a few theories devised to account for its probable origin and use and the material benefit which it secures to the authors thereof, but these have been of such an unsatisfactory character as not to merit the approval of the learned.

While some writers have surmised its application to be connected in some way with the wants of the newly-born *Aphis*, still the lack of evidence confirmatory of any such surmise has caused it to fall into neglect and disuse.

That this fluid has both a primary and a secondary purpose to subserve in the economy of the plant louse is a fact the truth of which stands off as gross as black from white. Recently, while engaged in the study of the

Aphis which particularly infests the blossoms of *Cucurbita ovifera*, I had the happy satisfaction of being a witness of a phenomenon which promised to solve the knotty problem. After a few moments of calm and deliberate reflection upon what I observed, the entire theory, the details of which I am about to delineate, became almost intuitively outlined upon my mind.

Feeding upon the flowers of this plant were hundreds of lice, the groupings of which not even a careless and hasty observer could fail to detect. There, like the patriarchal tribes we read about, were observable group after group, each composed of a head and a family of children of diverse ages and sizes. In the arrangement the young and newly-born, as if requiring the first care and earliest attention of the mother, were closely in her rear, the proximity to her presence in the case of the residue being apparently determined by their age.

While intently scrutinizing the actions of the various groups, one little fellow was observed to caress its parent by means of its antennæ, as if soliciting the bestowal of a favor. After the lapse of some few seconds the mother, acting in obedience to the child's wishes as thus expressed, slowly elevated the posterior part of her abdomen and ejected a honey drop upon the head of the latter, apparently to its infinite delight and satisfaction. It is my honest opinion, evidenced by repeated observations, that it is only during the first two days of the life of the offspring that this process of feeding is necessary, the digestive organs at this period being too feeble and delicate to partake of the strong juice of the flower without the entailment of injury. But after undergoing remarkable changes in the alimentary laboratory it becomes deprived of its injurious properties and rendered fit for the sustenance of life.

In conjunction with the previous discovery I remarked that the older and stronger seldom, if ever, deviated from the path over which their maternal head had passed, but seemed to find their chief good attained by following closely therein. It seems just to conclude that this would not be if they were amply qualified to look after their own temporal welfare ; but on the ground that parental provision and attention are still indispensable, the reason is obvious.

Plant lice being vigorous feeders, the manufacture and excretion of this fluid would necessarily be very great and profuse, and as nature does not work in vain, it might be argued that it is a sort of compensation which the insect lavishes upon the plant for the losses which it

momentarily sustains. But to this opinion I cannot assent, as experience teaches me that the plant does not receive the least benefit therefrom. Even if it possessed any healing virtues, these could not manifest any marked effects, owing to the very rapid multiplication of the lice, which are constantly probing the wounds by means of their puctorial apparatus and thus serving to heighten instead of lightening the evil. Viewing the subject in this light, nature would seem to be defeating her own ends.

It is true that these highly mischievous creatures are slightly held in check by a few species of the Ichneumonidæ, Syrphidæ and Coccinellidæ, but their rate of increase is so enormously out of proportion to the number of their enemies that very little good results to plants.

From the preceding remarks it is evident to the mind of every candid reasoner that plants receive no material advantage from this excretion. It now remains to indicate its use. That it is of great service to the newly born *Aphis*, totally unfitted as it is both by nature and by structure to imbibe the strong, yet sometimes acrid and bitter fluids of plants, there can be no doubt. But as the supply is clearly above the requirements of such, why the excess? Most assuredly to serve as *pabulum* for their stronger companions. How? By uniting with the plant's forced excretion, thus diluting and rendering it a suitable material for imbibition and digestion. That its primary use is to serve as food for the lice during their early existence I think from the argument adduced must be obvious to all.

That a secondary purpose also is subserved thereby, to wit, the preservation of the species, there are just grounds for belief. It is well known to naturalists that ants do not merely possess a fondness for sugar, gums and saccharine solutions, but that they also manifest a decided penchant for the rich juices and tender tissues of animals; the liquids aud solids of humbler forms of insect life being sought after and devoured with avidity, save when the animals possess some peculiar properties that recommend them to the mercy of their enemies.

There is no doubt that the soft and juicy *Aphis*, which is esteemed such a rich morsel of food by the *Coccinella*, was primitively as delicious to the *Formica*, and that it shared equally with other feeble creatures of its class the murderous assaults of the latter. This condition of things doubtless continued for ages, until there appeared on the scene an ant possessed of more sagacity than any of its fellows.

This ant having discovered the hidden virtues of the *Aphis* excretion there would dawn a new era in the history of the two species. The news of this discovery would doubtless become diffused not only through the colony of which this ant formed a part, but through the entire species and kindred species, for the *Formicidæ*, as is well known, exhibit in a remarkable manner the power of communicating their thoughts, wishes, &c., to each other.

As ants are endowed with a high degree of intelligence, considering the place which they occupy in the scale of created existence, they would not be slow to perceive that their chief good would be best attained by taking under protection the little creatures which are the authors of this luxury. From this time the ants would gradually abandon their sanguinary propensities, and little by little manifest their solicitude and regard for the latter by gentle strokes and caresses. The lice in turn perceiving the latter's disposition to friendliness, would cease by degrees to regard them as enemies, and would learn to cater to their physical wants. Thus would be developed these amicable relations which are known to exist between them, and which so admirably tend to their mutual good.

MICRO-LEPIDOPTERA.

BY V. T. CHAMBERS, COVINGTON, KENTUCKY.

Continued from Page 232, vol. v.

BUTALIS.

B. fuscicomella, Clem.

B. flavifrontella, Clem.

Both of these species occur abundantly in this locality; but the latter (my specimens can be nothing else) has the apical vein furcate before the apex, whilst Dr. Clemens says that it is simple. Mr. Stainton says it may be *B. basilaris*, Zeller.

B. matutella? Clem.

I am not altogether certain that my specimens belong to this species which I know only by Dr. Clemen's description. The neuration of the wings in my specimens is the same with that of Dr. Clemen's species as

given by him ; but there are some structural points in which it differs from *Butalis*, and Dr. Clemens' specific description is applicable to only a small proportion of individuals out of the many that I have examined. My specimens have been bred from larvae found mining the leaves of the great hog weed *(Ambrosia trifida)* and various species of Aster *(A. ericoides* and *A. sagittifolius)*. It spins a small web on the under side of the leaf from which it passes into the leaf, eating out the parenchyma in small patches. It makes several mines before passing into the pupa state. The mine is at first convoluted, narrow and filled with frass, but soon becomes a clear transparent blotch somewhat like the mine of *Bedellia somnulentella* in leaves of the morning glory *(Ipomea)*. It pupates in a dense web which it spins around itself, and which is but slightly attached to the surface of the leaf.

In the imago state the tongue is scaled at the base only, the wings are carried slightly deflexed in repose instead of being folded around the body as in the true species of *Butalis*. The primaries have only three instead of four veins beneath the apical one, and the head is rather less obtuse and is scarcely at all retracted. I had at first inclined to erect for it a new genus, and specimens in my cabinet were labelled *Sinoe ambrosiaeella*, and have been distributed to some correspondents under that name. The neuration of the wings is very similar to that of the genus *Aybia*, but the palpi are very different.

The imago is shining bronzy dark brown, with a purplish tinge. Usually there is a whitish yellow spot on the fold of variable size, sometimes spreading to the dorsal margin, sometimes scarcely discernible, and sometimes absent : there is always a distinct streak of the same hue at the beginning of the dorsal cilia, and a white patch on the abdomen beneath near the apex. *Al. ex.* ½ inch.

The larva is at first white with green contents ; then a small black spot appears on each side of the first segment, and afterwards a series or line of similar spots extends along the entire length of the larva and ultimately they become purple. In the later larval stages a purple line appears on each side of the median one. There is a small blackish spot behind each eye. In the adult larva the 9th and 10th segments become purple on top and the purplish longitudinal lines above mentioned are connected on the posterior margin of each segment by a transverse band of the same hue. It has sixteen feet, the thoracic ones being piceous. It may be found in all of its stages from June until the fall of the leaves.

ARGYRESTHIA.

A. oreasella. Clem.

Mr. Stainton states in his edition of the Clemens papers that this is the European *A. andereggiella.* It is the only species of the genus heretofore described from this country. I have never met with it in this locality but have received from Mr. Wm. Saunders several specimens with the information that they were all taken whilst resting on the leaves of a thorn bush *(Cratægus ——— ?).* In my specimens there is nothing that can be called an 'eye cap' only a few long scales pendant over the eyes from the elongate basal point of the antennæ, and the body, wings and antennæ more slender than in the species described below as *A. undulatella.* The neuration of the wings in *oreasella* is exactly that given by Mr. Stainton *(Ins. Brit. Lep. Tin., v. 3)* for *A. nitidella.*

A. undulatella. N. sp.

Not having recognized this as a true *Argyresthia* formerly, it was labelled in my cabinet *Chalciope undulatella,* and has been distributed to some correspondents under that name, and also under the names *Polyxo undulatella* and *Albunea undulatella.*

It is more robust than *oreasella,* the primaries are wider, the tuft on the vertex is larger, the basal joint of the antennæ is enlarged and has a distinct eye cap; the antennæ are much more robust and each joint is clothed with rather spreading scales so that it is enlarged towards its apex, the succeeding joint being inserted in the centre of its apex.

The neuration of the primaries is like that of *oreasella,* but in the secondaries the discal vein is absent from the subcostal to the first branch of the discal, so that the cell is partly unclosed.

I have named the species *undulatella* from its habit of 'see-sawing' on its middle legs before it comes to rest in the attitude of the other species of the genus, resting on its head with the apex of the body and wings projecting at an obtuse angle to the object on which it rests. It is very sluggish and not easily disturbed. It is found in considerable numbers in May resting on the trunks of Elm trees. The larva is unknown.

A. undulatella. N. sp.

Palpi brownish, at base white; face white around the mouth, brownish above. Tuft and eye caps snowy white. Antennae checkered with alternate black and white spots. Thorax and dorsal half of the primaries

snowy white; costal and apical portions brownish or dark brown, sometimes dusted with white and sometimes (usually) with streaks of the white extending into the brown portions, sometimes so as to divide it into two or three brownish costal streaks. There is great variety in the shade and proportions of the whitish and brownish portions of the wing, but snow white is the characteristic color of the basal and dorsal parts and brownish of the costal and apical parts, with the line between them more or less emarginate. *Al. ex.* ⅓ inch. Kentucky.

A. apici-maculella. N. sp.

In this species the eye cap is distinct as in *undulatella*, but the stalk is simple and slender as in *oreasella*. The neuration of the primaries is that given by Mr. Stainton for *A. arcuthina (loc. cit.)* In the secondaries it is the inferior portion of the discal vein that is absent instead of the superior, as in *undulatella;* that is the portion next to the median vein.

Shining silvery white, each joint of the antennae (except the basal one) is dotted above with dark brown. Primaries with a blackish or dark brown shining almost triangular spot at the apex, with three pale and indistinct brownish costal streaks before it; the first of these streaks is the shortest and most indistinct, and is placed at the beginning of the ciliae. The second is a little more distinct and sometimes extends entirely across the wing, and the third one always does so after dividing into two branches just before the apical spot. These streaks are usually more or less interrupted and sometimes spread over the apex so that it might perhaps be more correctly described as dusted than streaked. There is a bright though pale golden basal streak just within the costal margin. *Al. ex.* ⅜ inch. Kentucky, in oak woods, in June and July.

THE FAMILIES OF DIPTERA.

BY FRANCIS WALKER, LONDON, ENGLAND.

The two-winged flies are more important in nature than any other order of insects because of their number and diffusion, and the families may be briefly traced in succession previous to a more extended notice of each of them, in case the subject should become more interesting.

Family 1, PULICIDÆ.
" 2, MYCETOPHILIDÆ.

In the following arrangement the first manifestation of Dipterous existence is associated with the inmost recesses of man's habitation, and a few beasts and birds also partake of its presence in their dwellings. In this form it has some perfections in which it exceeds all the rest of the race, being unequalled in strength and in activity and in endurance of pressure. The dismissal of this wingless fly will be readily accepted, and there is a wide gap between it and the next form of Dipterous life wherein it is transferred to the fungoid-race, and here its work is to appropriate and elaborate the substance of the fungus and to raise it to its own level, and this will be said to be just contrary to the first scene in which it reduces the circulation of the vertebrata to its own purposes. In the second scene the fly has in some cases much resemblance in the body and in the legs to the first family, but the strength and the activity are comparatively passed away, and the structure of the mouth is much changed and much less effective; however, it has a compensation in the possession of wings. Even in the small extent of England there is yet much to learn about the fungus-flies, but there is a much wider field for observation in Canada and in the more northern regions of America where the gradual diminution and cessation of the race may be traced. Winnerty has contributed much more than any one else to the history of this family, and his synopsis of the sub-families is here translated:

A—Middle transverse vein elongated.
a—Brachial vein wanting.....1 Diadocidinæ
b—Brachial vein present.
*—Antennæ not very long.
†—Brachial vein long.....2 Mycetobinæ
† †—Brachial vein short.....3 Ceroplatinæ
* *—Antennæ very long.
†—Antennæ setiform.....4 Bolitophilinæ
† †—Antennæ filiform.....5 Macrocerinæ
B—Middle transverse vein not elongated.
a—Brachial vein present.....6 Sciophilinæ
b—Brachial vein wanting.....7 Mycetophilinæ

NOTES ON NOCTUIDÆ.

BY AUG. R. GROTE,

Curator of Articulata, Buffalo Soc. of Natural Sciences.

Agrotis badinodis, Grote.

♂. Antennæ pectinate. All the tibiæ armed or spinose. Abdomen a little flattened. Body slender; wings ample and wide. Nearest to *Agrotis collaris*, but with wider wings, and larger and differently colored. Smooth, pale brown. Transverse lines even, with coincident pale shades. Basal half-line evident; on the sub-basal space a pale dot followed by darker scales situate on median nervure. Transverse anterior line straight, touching the broader superior portion of the large orbicular on subcostal nervure, and leaving on the disc an intensely blackish brown space to obtain between the narrower lower portion of the orbicular and the line. Reniform, like the orbicular, concolorous, with narrow pale edging, hardly as large as the orbicular and broader below than above. Space between the spots deep, faintly reddish brown, deepening to median nervure. The diffuse median shade apparent below median nervure. Claviform large, concolorous, indistinctly limited. Transverse posterior line even, regularly arcuate, much as in *collaris*. Subterminal space dark reddish brown; subterminal line faint, narrow, irregular, pale; terminal space paler, less reddish brown than the subterminal. Terminal line broken into minute dots; fringes dark.

Hind wings concolorous, dark silky fuscous, with pale fringes. Beneath with a reddish brown tinge; a common diffuse fuscous line, and a dark discal spot on the hind wings which are palest and notably irrorate. Collar dark, thorax pale brown; abdomen like hind wings. *Expanse*, 35 m. m. *Habitat*, Maryland (coll. Lintner, No. 2506.)

The antennal pectinations are longer than in *triangulum*, the color different, the orbicular differently shaped.

Eurois occulta.

I have determined this species in the collection of Mr. Lintner, from New York, and in that of the Laval University, Quebec. It is a robust form, resembling *Mamestra nimbosa* in appearance, but structurally distinguished by the naked eyes, spinose fore tibiæ and excavated genital

pieces. It should be considered as the type of Hubner's genus *Eurois*, a name which has priority over *Aplecta*, and is cast for the same species, most of which, as Lederer has shown, are not properly separable from *Mamestra*. *Polyphaenis* seems to me equally valid with *Eurois;* I am not therefore agreed with v. Heineman's fusion of the species of the two genera under the name of *Aplecta*. The late Mr. Walsh has already referred to this species as found in this country. The list of species common to both continents, given in the Proc. Ent. Soc. Phil., vol. 3, p. 214, contains, however, several errors of different kinds, and is therefore unreliable.

Luperina reniformis, Grote.

♂ ♀. Eyes naked, without lashes. Tibiæ all unarmed. Maxillae weaker than in *Hadena*. Abdomen conical, apparently without tufts in the ♀, with longer dorsal depressed scales in the ♂, in either sex not with the thick squamation of *Hadena*. A little larger than *Hydr. sera*, which it resembles, but is more blackish, and the reniform is contrastedly annulate with white scales which usually extend along veins 3 and 4 at base, as in *Haworthi*. Beneath the thoracic squamation is somewhat woolly. Blackish brown; suhterminal space usually contrasting by its pale ochreous color. Median space wide. Orbicular an oblique finely and faintly pale ringed annulet, concolorous with the wing. Claviform indistinct, black. Reniform very narrow, its base visible between veins 3 and 4, neatly ringed with pure white, preceded by a pale vertical streak which appears to cover the closure of the cell, but which is probably part of the true outer annulus of the spot. Median shade black, irregular, faint. T. p. line accentuated on the nervules, even, pale between double lines, not retreated on cell 2, followed by black nervular dots on the subterminal space. Subterminal line preceded by a dark brown shade which shows some more determinate shade marks, produced opposite the median nervure. Terminal space black, narrow. Interspaceal terminal black dots. The narrow brown fringes cut with pale at extremity of the veins. Hind wings pale fuscous with soiled veins, beneath with distinct dot and faint transverse line. Varies by the darkening of the subterminal space, and obsolescence of the pale scales on the median nervules. Antennnæ simple in both sexes. *Expanse* 36 m. m. *Habitat* Canada; New York (Mead, No. 120; Lintner, No. 3588 and No. 3741 var.) Collection of Buffalo Society N. Sciences.

Hadena fractilinea, Grote.

♀. Eyes naked, with lashes. Thorax with anterior and posterior crests; the dorsal abdominal tufts are minute. Legs unarmed. Size moderate; squamation smooth. Dull blackish and very pale dull carneous brown. The pale color obtains along the internal margin of the fore wings and largely subterminally, extending to the apices without the undulate ferruginous subterminal line. The blackish color obtains at base and superiorly along costal region, and surmounting the pale subterminal space and over the constricted terminal space. The contrast between the two tints is variably strong, the blackish color becomes in some specimens dull brownish and the pale tint obscure and dusky. The median space is blackish above submedian fold, narrowed inferiorly; the ordinary spots small, orbicular concolorous with a fine pale annulation, reniform with the centre of the paler shade of the wing, with a dark internal streak. Transverse posterior line incompletely geminate, followed by a series of minute black and pale nervular dots. The twice prominently undulated subterminal is preceded by a more or less obvious ferruginous shade. Fringes black, narrowly cut with pale at the extremity of the veins. Hind wings concolorous brownish grey, rather dark, without lines; fringes pale with a narrow dark internal line. Beneath paler, dusted with dark scales, with a purplish or carneous tinge and a tolerably distinct exterior common line, more denticulately waved on secondaries. Patagia mixed with blackish scales; disc and tufts paler, touched with ferruginous; abdomen like hind wings. *Expanse*, 28 to 30 m. m. *Habitat*, Canada (Pettit, No. 1594); Albany (Lintner, Nos. 3568 and 1998). Much smaller and distantly recalling *rurea* in the disposition of the colors. It has apparently also a resemblance to the European *Agrotis putris*, but is generically distinct, and differs by the dark opaque secondaries.

Hadena cariosa.

Xylophasia cariosa, Guenee, p. 144.

The median lines are more distinct than in its immediate allies. The median space is narrowed inferiorly, the large claviform extends to the transverse posterior line.

Cerastis alternata.

Noctua alternata, Grote, Proc. Ent. Soc. Phil., Vol. III.

Eastern States; New York; Pennsylvania.

Cerastis cupida.

Noctua cupida, Grote, Proc. Ent. Soc. Phil., Vol. III.

Eastern States; New York; Pennsylvania.

Telesilla cinereola.

This species is the *Placodes cinereola* of Guenee, but the generic name had been previously used, and Herrich-Schaffer in consequence proposed the present designation for the European *amethystina*, and which should be retained for our species. Lederer's term *Eucarta* is later and has been withdrawn, in favor of *Telesilla*, by its author. Hubner enumerates the European species under Trigonophora, the type of which is quite distinct structurally from *Telesilla amethystina.*

Plusia gamma, (Linn).

Habitat, California (Hy. Edwards, No. 147).

I cannot distinguish the American specimens specifically. This species has been credited to Canada by Kirby (p. 307), and also to Hudson's Bay by Mr. Walker, in the British Museum Lists.

Adipsophanes miscellus, Grote.

Habitat, California (Hy. Edwards, No. 187).

ENTOMOLOGICAL READINGS,

Suggestive and Reflective.

BY W. V. ANDREWS, NEW YORK.

"There are no satisfactory distinctions between some of the moths which enable any one to say that they are of such and such species, and very frequently they are separated into different kinds because they happen to feed on various plants, and because the moths are not all colored in the same manner. Of course the Entomologists that believe in the real nature of species have taken a vast deal of trouble with the Noctuina, but those who do not think a species to be anything more than an abstract idea, and that it really consists of the sum of the variations of a closely allied series of forms, do not see the use of this Natural History hair splitting."—*Duncan's Transf. of Insects, p. 125.*

" Many naturalists have observed that the species of *Solenobia*, one of the Tineidæ, have a most exceptional power of reproduction. The maiden females of the genus lay eggs which can be hatched so as to produce larvæ, and a naturalist may breed a species for years without seeing a male *Solenobia*. This extraordinary fact is not without parallel amongst the Lepidoptera * * * and it is common among the bees and the aphides."—*Duncan's Transf. of Insects, p. 146.*

NOTE.—To many persons there will be, I hope, nothing new in the above statement, but there are more to whom it will not only be new but also incredible. In this connection I wish to state an occurrence, which, although not quite conclusive in its character, may, if known, recall to others similar occurrences with the same species, and they may have met with more definite results.

Two years ago, wishing to rear several broods of *Eacles imperialis*, I placed a female of that species in a favorable situation for attracting the male. I had forgotten whether the male usually remained in the company of the female for a long or a short time, and watched pretty closely till 1 o'clock a. m., for the purpose of ascertaining that fact.

I was much chagrined to find that at none of my visits was there any male visible. I was up betwixt 3 and 4 o'clock, a. m., still no male; and at broad daylight the result was the same. The female had, however, laid on the branches of the tree on which she was confined about thirty eggs, and although I considered them worthless, I put them into a small box without quite knowing why. I removed the female the next night to a still more promising spot, hoping that the eggs remaining in her might still be impregnated. No trace however of a male was visible, but, by the next morning, she had laid a quantity of eggs which I secured as before.

Every one of these eggs were fertile; but now comes the curious part of the matter. Every one of the larvae were of the dark brown variety, not a green one amongst them.

Now what I would like to learn is this: Does any one know of any case in which *imperialis* has produced fertile eggs without male assistance and, if so, what color were the larvae?

CORRESPONDENCE.

San Francisco, Cal., Nov., 1873.

Dear Sir,—

Many printed pages you devote to the question of nomenclature and rights of priority of generic and specific names. Allow me a small space in your columns to say a word in no way personal, still from a different point of view, yet with deference to the contending opinions.

In the first place I would claim a general acknowledgement for such compilers of entomological material as have in an exhaustive way at their time—so far as exhaustion is possible—published the results of their researches, and which compilations form entireties of certain large groups of insects. I will refer to only a few, among them Burmeister, for his Rhynchosa and Gymnognatha ; Gyllenhall, for his North European Coleoptera ; Harold and Gemminger's Munich Catalogue of the World's Coleoptera ; also, Ochsenheimer and Freitschke's work on Lepidoptera of Europe, this latter one *so* complete with Geometridæ and Micros.

All these compilers have worked with the full understanding of the value of generic names come down to them from earlier authorities, have been guided by the wish of letting Linne's and other great author's earliest names stand for the typical genus, giving room at the same time where, by newer discoveries, new genera had necessarily been created, for their interpolation. The great completeness of these published compilations, based upon conscientious researches, is what has created, if not all over the world, at least in Europe, the use and endearment of certain generic names that in my opinion might be everywhere respected, and will, I hope, everywhere and for ever be adopted. I see no necessity of going further back than the authority of such great compilers, even if a few errors of judgment, as likely, have occurred.

To restrict my observations to Lepidoptera only, I will here especially refer to Ochsenheimer and Freitschke's work of wonderful completeness ; it treats of European Lepidoptera only. The European Fauna has its representatives all the world over, and it is around and between European genera that the world's new species have to be ranged, whether or not the formation of new genera becomes necessasy. Such ground work or basis for a complete series of classes and genera as O. & F. have compiled might, in my opinion, be followed up and their generic names without omission be adhered to. Addressing American Entomologists, I would

allow myself the question: Might not all controversy about generic names, whether from earlier or later editions of Linne's or from other early authorities, be dropped, and all punctilious adhesion to priority be dismissed; might not the long-familiar names on the strength of above named second-hand authorities be with safety fixed upon as final and generally acknowledged?

Yours respectfully,

JAMES BEHRENS.

P. S.—It would be well if the authors of new created generic names would give their Greek or Latin derivations.

HABITAT, ECONOMY, ETC., OF AGROTIS FENNICA, EVERSMAN.

SPRING BANK, ST. CATHARINES, ONT., DEC. 22, 1873.

DEAR SIR,—

I am very anxious to obtain information respecting *Agrotis fennica*, Eversman, whether it is an abundant species in any part of Canada or the United States, and, being a stranger in this country, would be very thankful would any gentleman conversant with the insect, kindly aid me in the pages of the CAN. ENT., by any information he may posess touching its economy in the larval state, food plant, time of year when the imago is found, or any other necessary details.

Finally, should any Entomologist have duplicate specimens to spare, I need scarcely say they will be very acceptable, and later on in the season I will do my best in return to repay the obligation, and send an equivalent in any desirable species from this neighborhood.

I have read with much interest the articles on collecting in late numbers of the CAN. ENT., especially as my experience with cyanide of potassium as a killing material induced me years ago to abandon that method. I had the material both in tight-fitting boxes and glass-stoppered bottles, in all cases the cyanide being covered with a stratum of plaster of Paris. As a killer it does admirably, but, according to my experience, it renders the moths so rigid that in setting the wings are very liable to be torn in lifting them into position. This method of killing with cyanide was, indeed, condemned years ago in England owing to this very cause.

GEO. NORMAN.

ZOOLOGICAL MUSEUM, CAMBRIDGE, U. S., DEC. 20.

DEAR SIR,—

I have commenced to study and arrange the Coleoptera in the Museum, and hope to get help on all sides, and shall be particularly glad to see specimens in the less studied groups. At present I have finished the N. American Phytophaga, and hope to work at the Staphylinidæ ere long. I also want to see all the Dytiscidae that I can, as it is only by a long series that much can be done. I shall be glad to hear from any one interested in exotic insects, also. Yours truly,

G. R. CROTCH.

LARVA OF P. BREVICAUDA.

We extract the following from a letter recently received from Mr. Edwards :—Miss Peart has drawn the larva of *brevicauda*. It differs from *asterias* larva in that the black transverse bands are broken, and no yellow spots are between them ; the lowest black spot is triangular, and so to each band. It is more like *zolicaon*, although that has yellow spots. The point is that it is not *asterias*.

W. H. EDWARDS, Coalburgh, W. Va., 18th Nov., 1873.

BOOK NOTICES.

Hackberry Butterflies. Descriptions of the early stages of Apatura Lycaon, *Fabr.* and Apatura Herse, *Fabr.*, with remarks on their synonymy, from the Trans. St. Louis Acad. Science. 8 vo., pp. 14, with four illustrations by Chas. V. Riley, M. A., Ph. D., St. Louis.

On Platypsyllidæ, a new family of Coleoptera, from the Proceedings of the Zoological Society of London, 8 vo., pp. 6, with one plate, by J. L. Le Conte, M. D.

Seltsame Geschicte eines Tagfalters, von Samuel H. Scudder.

Proceedings of the Boston Society of Natural History, vol. xv, parts 3 and 4, Dec., '72 to April, '73.

Nature, to December 11th.

Science Gossip, December.

American Naturalist, December, 1873, January, 1874.

Canada Farmer, December 15 and 30.

Prairie Farmer to Dec. 27.

The Horticulturist, Nov. and Dec..

Rural New Yorker to Jan., '73.

American Agriculturist, Jan.

Maine Farmer to Dec. 27.

The Canadian Entomologist.

VOL. VI. LONDON, ONT., FEBRUARY, 1874. No. 2

THE FOOD-PLANTS OF EUROPEAN BUTTERFLIES.

BY S. H. SCUDDER, CAMBRIDGE, MASS.

Kaltenbach is publishing a work entitled *Die Pflanzen-Feinde aus der Classe der Insecten*, two parts of which have appeared and carry the investigation through the willows. He enumerates all the German insects known to feed upon particular plants; annotated lists of more than three hundred species of insects are sometimes ascribed to a single tree. Among these are many butterflies, and by collating them I have prepared the following list, believing that, as it is fuller than any yet published, it will be of great service to those who are endeavoring to discover or extend the histories of our own butterflies. As soon as the work of Kaltenbach is completed, a supplement will be prepared to this list. The nomenclature of the butterflies is altered to make it accord with Staudinger's last catalogue.

1. *Apatura iris*—Salix caprea, S. aurita.
2. " *ilia*—Salix, Populus tremula, P. dilatata.
3. " " var. *clytie*—Populus tremula, P. canescens.
4. *Limenitis populi*—Populus tremula.
5. " *camilla*—Lonicera cœrulea, L. xylosteum, L. caprifolium, L. periclymenum.
6. " *sibilla*—Same plants as the preceding.
7. *Vanessa levana*—Urtica dioica.
8. " *egea*—Salix, Parietaria officinalis.
9. " *C. album*—Ulmus campestris, Humulus lupulus, Urtica urens, Ribes rubrum, R. grossularia, Corylus avellana, Lonicera xylosteum.
10. " *polychloros*—Pyrus communis (pear), P. malus (apple), P. cydonia (quince), P. cerasus (cherry), Ulmus, Salix, Populus, Cornus.

11. *Vanessa xanthomelas*—Populus, Ulmus, Salix caprea, S. acuminata, S. glauca, S. vitellina.
12. " *L. album*—Ulmus, Salix.
13. " *urticæ*—Urtica hispida, etc.
14. " *io*—Urtica, Humulus.
15. " *antiopa*—Salix, Betula, Populus, Tilia (Ulmus is not given.)
16. " *atalanta*—Urtica dioica, U. urens.
17. " *cardui*—Cirsium oleraceum, C. arvense, C. palustre, C. lanceolatum, Carduus natans, Malva rotundifolia, Gnaphalium arenarium, G. luteoalbum, Achillea millefolium, Artemisia vulgaris, Filago arvensis, Onopordum acanthium, Cynara scolymus, Centaurea benedicta, Urtica dioica, Carlina.
18. *Argynnis aphirape*—Polygonum distorta, Viola palustris.
19. " *selene*—Viola canina, V. tricolor.
20. " *euphrosyne*—Viola canina.
21. " *pales*—Viola montana.
22. " *dia*—Viola odorata.
23. " *daphne*—Viola, Rubus idæus, R. fruticosus.
24. " *ino*—Urtica.
25. " *lathonia*—Viola arvensis, V. tricolor, Hedysarum onobrychis, Anchusa officinalis.
26. " *aglaja*—Viola canina.
27. " *niobe*—Viola odorata, V. tricolor.
28. " *adippe*—Viola odorata, V. tricolor.
29. " *paphia*—Hesperis tristis, Viola canina, Rubus idæus, Urtica.
30. " *pandora*—Viola.
31. *Melitæa cynthia*—Plantago lanceolata, Pedicularis rostrata.
32. " *maturna*—Melampyrum nemorosum, Populus tremula, Salix capræa, Fraxinus excelsior, Veronica, Plantago.
33. " *aurinia*—Geranium sanguineum, Scabiosa, Veronica, Plantago.
34. " *cinxia*—Plantago lanceolata, Veronica, Hieracium pilosella, H. canescens.
35. " *phœbe*—Centaurea scabiosa, C. jacea.
36. " *trivia*—Verbascum thapsus, V. nigrum.
37. " *didyma* — Artemesia abrotanum, Plantago, Centaurea, Stachys, Linaria vulgaris, Veronica, Teucrium chamædrys.

38. *Melitæa dictynna*—Melampyrum nemorosum, Spiræa aruncus, S. ulmaria, Veronica.
39. " *athalia*—Melampyrum sylvaticum, M. pratense, M. nemorosum, Plantago, Veronica chamaedrys, Chrysanthemum corymbosum, Digitalis ochroleuca.
40. " *aurelia*—Plantago.
41. " " var. *britomartis*—Veronica chamaedrys, Melampyrum pratense.
42. " *parthenie*—Plantago lanceolata, Centaurea jacea, Melampyrum pratense.
43. *Nemeobius lucina*—Rumex, Primula.
44. *Thecla betulæ*—Prunus spinosa, P. armeniaca.
45. " *spini*—Rhamnus saxatilis, R. cathartica, R. frangula, Prunus spinosa, P. domestica.
46. " *W. album*—Ulmus campestris.
47. " *ilicis*—Ulmus.
48. " *acaciæ*—Prunus spinosa.
49. " *pruni*—Prunus spinosa, Amygdalus communis, Rhamnus cathartica.
50. " *rubi*—Prunus spinosa, Rhamnus, Cytisus, Hedysarum onobrychis, Amygdalus persica, Rubus, Genista, Ledum palustre.
51. *Lycæna bœtica*—Spartium, Colutea, Phaca bœtica.
52. " *telicanus*—Lythrum salicaria.
53. " *argiades*—Lotus corniculatus, Anthyllis vulneraria, Medicago falcata, M. lupulina, Trifolium arvense, T. pratense, Pisum sativum.
54. " *argyrotoxus*—Genista, Colutea arborescens, Trifolium.
55. " *argus*—Rhamnus, Trifolium montanum, Mellilotus officinalis, Genista germanica, Spartium scoparium, Hedysarum onobrychis, Lotus corniculatus, Erica vulgaris.
56. " *optilete*—Vaccinium oxycoccos.
57. " *orion*—Sedum telephium.
58. " *astrarche*—Erodium cicutarium, Geranium dissectum, G. pusillum.
59. " *icarus*—Trifolium, Mellilotus, Genista, Ononis spinosa, Astragalus glyciphyllos, Fragaria vesca, Medicago.

60. *Lycæna bellargus*—Trifolium, Coronilla varia, C. montana, Hippocrepis comosa, Genista sagittalis, Stachys.
61. " *coridon*—Vicia, Astragalus, Coronilla varia.
62. " *hylas*—Trifolium, Mellilotus officinalis.
63. " *dolus*—Trifolium.
64. " *damon*—Hedysarum onobrychis.
65. " *argiolus*—Rhamnus frangula, Mespilus, Pyrus malus.
66. " *minima*—Anthyllis vulneraria.
67. " *semiargus*—Mellilotus.
68. " *cyllarus*—Astragalus glyciphyllos, Trifolium, Mellilotus, Genista sagittalis, G. germanica, Hedysarum onobrychis.
69. " *jolas*—Colutea arborescens.
70. *Polyommatus virgaureæ*—Solidago virgaureæ, Rumex acutus, R. acetosa.
71. " *dispar*—Rumex, Polygonum.
72. " *hippothoe*—Rumex acetosa.
73. " *alciphron*—Rumex acetosa.
74. " *dorilis*—Rumex acetosa, R. acetosella.
75. " *phlæas*—Rumex acetosa.
76. " *amphidamas*—Rumex acetosa, Polygonum bistorta, Viola canina.
77. *Rhodocera rhamni*—Rhamnus cathartica, Frangula, Mespilus germanica, Pyrus.
78. " *cleopatra*—Rhamnus alpinus.
79. *Colias palæno*—Hydrocotyle vulgaris, Vaccinum uliginosum.
80. " *hyale*—Coronilla varia, Trifolium, Vicia.
81. " *myrmidone*—Cytisus biflorus, C. nigricans.
82. " *edusa*—Onobrychis, Cytisus.
83. *Pieris brassicæ*—Brassica, Rhaphanus sativus, Cochlearia armoracia, Sinapis, Lepidium sativum, Tropæolum, Cheiranthus annuus.
84. " *rapæ*—the same plants as the preceding, and also Reseda.
85. " *napi*—Brassica oleracea, B. napus, Reseda lutea, R. luteola, R. odorata, Turritis glabra, Alliaria officinalis, Sinapis.
86. " *daplidice*—Reseda lutea, Turritis glabra, Erucastrum, Rhaphanus rhaphanistrum, Sisymbrium sophia, Capsella bursa-pastoris, Alyssum incanum, Sinapis, Thlaspi.

87. *Aporia crataegi*—Cratægus oxyacantha, Prunus spinosa, P. domestica, P. padus, Pyrus malus, P. communis, Mespilus, Sorbus.
88. *Anthocaris cardamines*—Alliaria officinalis, Cardamine impatiens, Turritis glabra, Brassica campestris, Hesperis, Sinapis, Thlaspi.
89. *Leucophasia sinapis*—Lotus corniculatus, Lathyrus pratensis, Trifolium pratense (Sinapis is not given).
90. *Parnassius apollo*—Sedum album, Telephium, Sempervivum tectorum.
91. " *mnemosyne*—Corydalis bulbosa, C. solida.
92. *Papilio sinon*—Prunus spinosa, P. domestica, Pyrus malus, P. communis, Amygdalus persica, A. communis, Quercus.
93. " *machaon*—Carum carui, Anethum foeniculum, Apium graveolens, Daucus carota, Pimpinella saxifraga, Angelica sylvestris, Peucedanum chabrei, Heracleum, Oreosilinum.
94. *Nisoniades tages*—Iberis pinnati, Eryngium campestre, Lotus corniculatus, Coronilla varia.
95. *Spilothyrus alceæ*—Malva.
96. *Syrichtus alveus*—Polygala chamæbuxus.
97. " *malvæ*—Malva moschata, Plantago lanceolata, Fragaria, Comarum, Rubus.
98. " *sao*—Rubus idæus.
99. *Carterocephalus palæmon*—Plantago.
100. *Hesperia sylvanus*—Plantago major, Althea rosea, Malva moschata, Lavatera communis.
101. " *comma*—Coronilla varia.

NOTES ON COLLECTING CATOCALAS.

BY ROBERT BUNKER, ROCHESTER, N. Y.

In many respects the Catocalas are among the most interesting of the moths. The contrast of color between their fore and hind wings renders them objects of great beauty, and hence these fair forms of the woods

are eagerly sought after by collectors. My spare time this season was spent in collecting Catocalas. In this part of the country they may be found from the first of June till the first of November. *Amasia* and *ultronia* are seen first; I took a fine *amasia* on the 29th of May, and an *ultronia* on the 10th of June. *Cara* and several other species may be found as late as the first of November.

Oak woods, where the trees are young and sufficiently scattered to admit the sunlight, are the most favorable places for collecting. In a small piece of woods of not more than four acres, I captured thirty-two specimens, among which were thirteen different species. I was unable to visit the place more than eight times; probably many more could have been taken had my visits been more frequent. My collecting was done in this manner: On approaching a tree I examined the trunk carefully up as high as the first limbs; if a Catocala was seen, and low enough down to reach, I used a paper box (collar box) to secure the prize, but if high up the net was brought into requisition. If I failed to find one, I gave the tree a vigorous shake, and if one was lurking anywhere about the trunk it was sure to start up and fly, generally but a short distance, when it would settle, and by cautiously approaching the tree I found no difficulty in securing it. Sometimes two would start up from one tree, generally male and female, and in such a case it was no easy matter to follow both of them; still I generally managed to secure them. As I examined trees I marked them with chalk to save the trouble of working the ground twice over.

Catocalas, like the lappet moths, usually alight on objects that harmonize with their own colors. Those with light grey fore wings were found on white oak *(Quercus alba)*, and those with dark wings, like *epione* and *cara*, on black oak *(Quercus nigra)*.

In a late number of the ENTOMOLOGIST, Mr. Grote gave us a list of the Catocalas, fifty-nine in number; he now adds four new ones to the list. My impression is that additional species will be found in the northern and middle States.

ON SOME OF OUR COMMON INSECTS.

12. *THE AMERICAN COPPER UNDERWING—*

Amphipyra pyramidoides, Guen.

BY THE EDITOR.

This insect is a troublesome one in many parts of our province, and is yearly increasing. It first attracted attention by its depredations on the foliage of the vine, but now, with us, while it is still a plague in the vinery, it is more abundant on plum and apple trees, and is also common on the thorn. It has been known in popular language as "the pyramidal grape vine worm" on account of the larva having a pyramidal hump near the end of its body; also as "the green grape vine worm," in consequence of the larva being of a green colour, but since it is not by any means restricted to the grape, we prefer the common name placed at the head of this article—"the American copper underwing"—given to it because the hind wings of the moth are of a lustrous copper colour. A very similar moth, *Amphipyra pyramidea*, Linn., is common in Europe, the larva of which feeds on the oak, elm, poplar and other trees, and since this insect is known in England as "the copper underwing," we think the common name we have referred to, which was first suggested by Mr. Riley, is a very appropriate one for our species.

Fig. 3,

The larva, of which a very good representation is given in figure 3, first attracts notice early in June, when it may be found about half grown and feeding vigorously; by the middle of the month it has usually attained its full size, when it measures from one and a quarter to one and a half inches in length. The head is rather small, flattened in front, and of a whitish green color, with the mandibles tipped with black. The body is of a delicate whitish green, a little darker on the sides, with a white stripe down the back, a little broken between the segments and somewhat widened behind. On each side, close to the under surface, there is a

bright yellow stripe which is most distinct on the hinder segments, and a second one of the same color, but fainter, half way between this and the dorsal line; this latter is more distinct on the posterior portion of the body, where it follows the peculiar pyramidal hump or prominence on the twelfth segment, as shown in the figure. The under surface of the body is pale green.

When full grown this caterpillar descends to the ground, and, drawing together some loose fallen leaves or other rubbish, spins within a loose silken cocoon, where in due time it changes to a dark, shining brown chrysalis, from which the moth usually escapes in the latter part of July; those which we have reared have appeared about the 20th of the month.

The moth, see figure 4, measures, when its wings are expanded, about one and three quarter inches. The fore wings are dark brown, shaded with paler brown, and with dots and wavy lines of a glossy grey or dull whitish hue. The hind wings are reddish with more or less of a coppery lustre; browner on the outer angle of the front edge of the wing, and paler towards the hinder and inner angle.—The body is dark brown with the hinder portion banded with lines of a paler shade. The under surface of the wings is much lighter in color than the upper.

Fig. 4.

In what stage of its existence this insect passes the winter months has not yet been determined. Whether the eggs, which are probably laid during August, remain dormant during the remainder of the summer and hatch early the following spring, or whether the eggs hatch into larvæ early in the fall, and the larvæ, while still young, become torpid and sleep through the long winter months, remains undecided; we incline, however, to the latter view.

Where the caterpillars prove troublesome their numbers may be lessened by jarring the trees or vines on which they are feeding with the hand, when they will usually drop to the ground, where, on account of their green color, they can be readily seen and destroyed.

ON ANISOPTERYX VERNATA AND POMETARIA.

BY H. K. MORRISON, CAMBRIDGE, MASS.

There has been some confusion lately in regard to the limits and synonymy of these two common species, partially due to Dr. Harris' unsatisfactory reference to them in his "Report on the Insects of Massachusetts," 1841, and to the inaccessibility of Prof. Peck's original description of *A. vernata*.

In the numerous notes on these species and references to them in recent publications, they are in nearly all cases confounded together or wrongly determined; and I have not found them correctly named in a single collection which I have examined.

I reprint the descriptive portion of Prof. Peck's excellent essay. He was only acquainted with *vernata* and makes no reference to any other species. Dr. Harris considered *pometaria* the true "canker worm," and *vernata* a variety; on what grounds I do not know, as the latter is much the commoner, and, I presume, the most destructive. The following description of *vernata* was published in the Massachusetts *Magazine*, vol. vii, Sept. and Oct., 1795, and reprinted in 1827 in the New England *Farmer*, vol. v.:

"*Phalæna vernata, geometra geticornis, alis cinereis, fascii tribus obscuris, fuscis, posticis immaculatis, femina aptera.* The wings are ash color with three obscure blackish transverse stripes, and a small dash of the same color at the tip; the under wings are of a uniform color and rather lighter than the ground color of the upper ones. The body of the female is nearly four lines in length, ash colored and marked on the back with a brown list extending from the thorax to the tail. In thirteen days the females deposit their eggs; these are placed in the crannies of the bark in the forks of small branches, and where there are spots of moss upon the smaller limbs; they seem most fond of insinuating themselves in the cavities between its leaves. For this purpose they are furnished with a tube through which the egg is passed. The egg is elliptic, one-thirtieth of an inch in length, of a pearl color with a yellowish cast. The larvæ when full grown are about 9 lines long. The head pale, marked on each side with two transverse blackish stripes, the

"back ash colored, marked lengthwise with small interrupted dusky lines. "The sides blackish, with a pale line along the length of the body; there "are two white spots on the last segment of the body. The abdomen "beneath is ash colored. The chrysalis is about five lines long and one "and one-half lines in diameter, of a light hazel color, oblong and "pointed at one end. Their natural and regular time of rising is about "the middle of March, but happens earlier or later according to the "warmth or coldness of the season."

Dr. Harris described the male of what he considered the true "canker worm moth" as follows. The female he seems to have confounded with the females of *vernata*.

"The fore wings are ash colored, with a distinct whitish spot on the "front edge near the tip; these are crossed by two whitish, jagged bands "along the sides of which there are several blackish dots; the outermost "band has an angle near the front edge, within which there is a short, "faint, blackish line, and there is a row of black dots along the outer "margin close to the fringe. The hind wings are pale ash colored, with "a faint blackish dot near the middle. The wings expand about one "inch and a quarter. This species may be called *Anisopteryx pome-"taria*."

It has been thought that perhaps these two forms were the autumnal and vernal broods of the same species.

That the two species are entirely distinct, differing from one another in the most positive and unmistakable characters, has been abundantly shown by Mr. B. Mann in the Proceedings of the Boston Society of Natural History.

I give below the distinctive characters of the two species arranged in the most convenient form for comparison. It will be noticed that while the species resemble each other closely externally, the differences, particularly in the females, are in many cases structural.

Vernata, Peck.	*Pometaria*, Harr.
The first seven rings of the abdomen in both sexes bear each upon the back two transverse rows of stiff red spines, pointing towards the end of the body.	The first seven rings of the abdomen in both sexes with no spines upon the back.

Fore wings of male ash colored or brownish gray, the whitish spot found on the fore wings of *pometaria* wanting.

The whitish bands found on the fore wings of *pometaria* are wanting, but there is a jagged, submarginal white band on the upper side of the fore wings in most specimens.

Three interrupted dusky lines across the fore wings, instead of two lines as in *pometaria;* sometimes these lines are only indicated by dark spots on the costa and by blackish dashes at the crossing of the median nervure.

There is an oblique black dash near the tip of the fore wings, also a distinct, nearly uniform, continuous black line before the fringe.

The white band found on the hind wings of *pometaria* is wanting.

Abdomen of the female terminating in a retractile ovipositor rather acutely tapering behind.

Body and legs of the female clothed with whitish and dark brown dentate scales; general coloration not uniform; a black, dorsal, longitudinal, interrupted band on the abdomen; a whitish patch on each side of the beginning of the band; the spines often give a reddish tinge to the part they occupy.

Fore wings of male ash colored, with a distinct whitish spot on the front edge near the tip.

Forewings crossed by two whitish jagged bands; the outermost band has an angle near the front edge; the whitish bands are sometimes obsolete, in which case only the whitish spot remains.

Along the sides of the whitish bands there are several blackish dots, each on a nervule, and all generally connected together by a dusky band which includes them.

Within the angle of the outermost whitish band, near the front edge, there is a short, faint, blackish line, and there is a marginal row of black dots before the fringe.

In most specimens a curved white discal band extending across the hind wings.

Abdomen of the female without ovipositor, terminating bluntly.

Body and legs of the female smooth, clothed with glistening brown and white truncate scales intermixed, giving the body the appearance of uniform shining, dark ash color above, and gray beneath.

In regard to the time of appearance of the species, *vernata* emerges in the spring (March and April). I have never seen a specimen taken in the autumn. It is by far the commoner of the two. *Pometaria* is not so common as *vernata*, and the great majority of specimens emerge in the fall or early winter, very rarely a few remaining over until the spring. The spring specimens of the male are very strongly marked, of a dark smoky brown, resembling somewhat in coloration the dark suffused variety of *Cleora pulchiaria*, Minot. Although I have searched particularly for them, I have never been able to take but two males. The females seem to be more common in the spring, and do not differ from the fall specimens.

I have examined 150 male, 70 female *vernata;* 40 male, 60 female *pometaria*, taken in the autumn, and 2 male, 10 female *pometaria*, taken in the spring.

NOTES ON THE LARVA OF BOARMIA LARVARIA, GUENEE.

BY THE EDITOR.

Several of the larvæ of this species were taken on the 24th of June ; they were found feeding on willow and taken by beating the bushes over an umbrella.

Length one inch ; body cylindrical.

Head medium-sized, flat, bilobed ; brownish grey in front, a little darker at the sides, with a patch of brownish black on the summit of each lobe, and a few short brownish hairs ; mandibles brownish black.

Body above reddish brown, smooth and glossy, having here and there a greenish tint, and with many fine longitudinal lines of a slightly darker shade scarcely visible without a lens. On each segment, from fifth to twelfth inclusive, there are two small black dots on each side of the dorsal line, and on sixth segment a black tubercle with a small patch of white at its base in front. On seventh, eighth, ninth, tenth and eleventh segments are similar black tubercles, but much smaller, with a whitish dot on the anterior part of the base of each, most distinct on tenth and eleventh

segments. Twelfth segment with two scarcely raised black tubercles above, a short black streak on each side behind them, and a small whitish spot in front; terminal segment with a few very fine short brownish hairs. Spiracles small sub-oval, pale ringed with black.

Under surface similar to the upper, with the greenish tint a little more decided and a central stripe of greenish white widening between the two pairs of prolegs; each segment from fifth to ninth has several small black dots. Feet yellowish green, faintly ringed with black at their base; prolegs green, marked with reddish brown on the outside.

Two specimens entered the chrysalis state on the 25th of June; one produced the imago on the 9th of July, the other on the 12th. The moth was kindly determined for me by Dr. A. S. Packard, Salem, Mass.

A DISSERTATION ON NORTHERN BUTTERFLIES.

BY WILLIAM COUPER, MONTREAL.

The Swallow-tail Butterflies which occur on the Islands of Anticosti and Newfoundland, and on the north coast of the Gulf of St. Lawrence are at present a subject of dispute, both as to species and position among the Papilionidæ. Having sóme knowledge of their localities and geographical range, I venture to state my opinion on the matter.

When I first visited the south coast of Labrador, in 1867, a Swallow-tail butterfly was taken by me at Natashquan, where it was rare. I supposed it then to be a boreal variety or race of *Asterias*, and on my return to Quebec presented two or three specimens to the Rev. Mr. Innes, who had a collection of Lepidoptera among which were specimens of a smaller *Papilio*, which he informed me came from St. John's Newfoundland. Mr. Innes removed afterwards to London, Ont., and I heard no more of the Labrador or Newfoundland *Papilios* until Mr. W. Saunders described his *Papilio brevicauda* in "Packard's Guide." Mr. Saunders obtained his specimen through the kindness of Mr. Innes, who told him that he had received it from an officer who had been spending some time at St. John's. If the *Papilios* taken by me at Natashquan, Labrador were in Mr. Innes' cabinet when Mr. S. obtained the specimen described as *brevicauda*, did Mr. Innes point them out to Mr. S. in order to compare with those from Newfoundland? This primary question should be answered, because there is no evident difference between the *Papilio* of

Anticosti and that of the Labrador coast.* Yet Mr. Saunders states (April 30th, 1873) "that he saw one of my Anticosti specimens at Mr. "Mead's, in New York, but did not feel at all satisfied that it was identi- "cal with his *brevicauda*. *Polyxenes* is Scudder's new name for *asterias*, "but he (Scudder) does not regard *brevicauda* now as identical with it."

I have tried to obtain a specimen of the Newfoundland *Papilio*, and communicated with a gentleman residing at St. John's, Newfoundland, asking him to procure specimens of this swallow-tail butterfly for me. He says: "In my opinion it is very rare in this district. During the last "three summers I have seen but one specimen, and some of my "friends here confirm the opinion regarding its rarity." That he has reason to believe that in other parts of the Island it is more abundant, as he has heard of it at Cod Roy, on the western coast, and Notre Dame Bay, in the north of the Island. He adds "that a Halifax "Entomologist has been enquiring for it on the south coast of the Island "for some time, without success."

I am confident that it becomes scarce as we proceed down the south coast of Labrador, towards the Straits of Belle Isle. The true *habitat* of the *Papilio* (specimens of which I gave Rev. Mr. Innes in 1867) is the Island of Anticosti, where it occurs more abundantly than in Labrador or Newfoundland. It is met with occasionally at Mingan, but more commonly at the mouths of rivers east of Seven Islands.

The description in "Packard's Guide" does not exactly correspond with the external markings of the Anticosti specimens, and I candidly state that I have never seen a butterfly whose general features are more uniform than in that of the latter Island.

Mr. Edwards, of W. Virginia, states that it is not related to *asterias*, but to *machaon* and *zolicaon*. In a letter from him, dated August, 1873, he thinks that the Anticosti *Papilio* is undoubtedly *brevicauda*, Saunders, whose description was taken from a single ♀, and the fulvous prevailed remarkably in the yellow spots. That the description of *brevicauda* fits one of the Anticosti ♀ exactly. He points out, however, wherein the Anticosti *Papilio* differs notably in two respects from *machaon*, or the American representative of that, viz., *P. Aliaska*, Scudder, and from *zolicaon*. 1st—the hind wings are black, while in the others from base to

* The specimen Mr. Innes gave me was from Newfoundland. He did not show me Mr. Couper's specimens.—Ed. C. E.

disc they are yellow. 2nd—the abdomen of the Anticosti species is spotted with yellow like *asterias*, while all the others have that part black with yellow lines, as in *turnus*. In a letter from Mr. Edwards, dated Sept. 1st, 1873, he says that "we had all been looking for affinity to *asterias*, while the butterfly belonged to another group. Strecker described it as a var. of *asterias*, and so Packard considered *brevicauda* a var. of *asterias*. In my synopsis I put the species down as a var. of *asterias*. It is many years since I saw the original *brevicauda*, and I have forgotten its appearance; but in reading over the description in Packard, I consider that the excess of fulvous is the only permanent distinction between the Newfoundland and Anticosti specimens." Mr. Grote agrees with Mr. Edwards that the *Papilio* collected in Anticosti is *brevicauda*, Saunders, but I think my memory serves me correctly when I state that the specimens of *Papilio* in Mr. Innes' collection from Newfoundland were considered distinct by the latter gentleman and myself, at that time. The Newfoundland specimens were smaller than those from Labrador; indeed, we looked on the St. John's butterfly as dwarfed, but the species was not then determined.

Not having access to all the forms constituting connecting groups of *Papilios*, I am not prepared to concur with the gentlemen who have classed it with *machaon* or *zolicaon*. At first view the Anticosti butterfly takes the characters of *asterioides*, Reakirt, and *asterias*, while the form has a mere approach to *machaon* and *zolicaon*. I suppose it is on account of the latter affinity that Mr. Edwards places it near *machaon* and *zolicaon*, but there are these notable differences between the Anticosti *Papilio* and *P. Aliaska*, Scudder, or *zolicaon*, viz., 1st, the hind wings are black and the *interior band* underneath is constant in form and number of spots, and the spots are not wedged into each other as in *zolicaon* or *asterias*. 2nd, the abdomen is spotted with yellow similar to *asterias* and *asterioides*, and in fact, in my judgment, the Anticosti *Papilio*, with the exception of the width of the macular band, is a prototype of *asterioides*, Reakirt, from Mexico. Constancy of marks on the wings and body of an insect, no matter to what order it belongs, is undoubtedly *bona fide* evidence of the stability of the species.

We have evidence of European insects introduced into this country becoming acclimatized and segregated in course of years, and a few of these which we now find holding a local existence on such islands as Anticosti and Newfoundland, may have in earlier times found it necessary

to search for more congenial localities, there becoming attached to new food plants, which, no doubt, have an influence in diversity of colors. We have an instance of this in the American representative of *Vanessa antiopa*, which is of rare occurrence in Anticosti; but where it retains the features of its English congener, while those taken in more southern latitudes assume a different coloration. Instance also the introduction of *Pieris rapæ* into Canada of late years. This species has now a struggle to exist in the latitude of Quebec, but so long as its food plant is abundant it will continue with us. It has been gradually moving south, where, with a more favorable climate, it propagates extensively. This butterfly also shows the effects of climate in the appearance of a yellow variety. It may be possible that the butterflies called *brevieauda* by Mr. Saunders and *Anticostiensis* by Mr. H. Strecker, had a similar origin. The connecting link or affinity of *Papilio brevicauda* with *asterias* is only a perplexing attempt to make the Anticosti form an ally of the continental *P. polyxenes*, which is Scudder's new name for *asterias*.

I cannot find sufficient reason for such connection, as there is quite a distinction between the larva of *asterias* and that of the Anticosti butterfly. It may, however, be discovered that an affinity occurs in *P. asterioides* and *brevicauda* or *Anticostiensis;* and although the former is found in Mexico, I see no reason to doubt their connection in years gone by.*

Considering the present rate of travel of *Pieris rapae* southwardly, it may during the course of another twelve years reach Costa Rica, and there change so much externally as to be claimed as another variety, while the Canadian form will still be called the segregated species. Mr. Hermann Strecker, of Reading, Penn., in his "Rhap. et Hetero." No. 6, page 48, gives the geographical distribution of *asterias* as follows:—"The "ordinary form, with but little variation, occurs from Canada to Florida," taking a southern range, while it extends west as far as Colorado. He considers *asterioides* to be the tropical form of *asterias*, that *brevicauda*

* NOTE.—"The insects of separate arctic regions have a great mutual resem-"blance, and the difference between them increases in the successive concentric "circles from the above regions towards the equator. It has been said that the "advance of the glacial period was accompanied by the migration of insects "southwards, and that the present distribution of insects was effected by the pre-"valence of this epoch, and by the succeeding temperate epoch."—*F. Walker, F. L. S., in Can. Ent., vol. iii, p. 148.*

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DESCRIPTION AND HABITS OF A SUPPOSED NEW SPECIES OF LEPIDOPTEROUS LARVA OF THE GENUS SPHINX.

BY THOMAS G. GENTRY, GERMANTOWN, PA.

Des.—Body cylindrical, tapering gradually anteriorly, 12-jointed, exclusive of head. Head sub-elliptical, thickly punctured, moderately pubescent and of a yellowish brown color. Oral appendages largely developed. Antennæ 3-jointed, cylindrical, acuminate, the basal joint very long and quite thick. A dark purplish curved band passes from the crown of the head to the right antenna. Prothoracic segment surmounted by a transversely elongated, punctated, corneous saddle, concolorous with the head.

General color dark purple, relieved by two series of dorso-lateral gold-colored dots, ranging from the posterior half of the metathoracic to the seventh abdominal segment (each series containing twenty-seven points). The anterior half of the second, to the seventh abdominal segments inclusive, each furnished with a single, much larger, similarly colored one. Above the line of the prolegs, intermediate between this and that of the spiracles, on each side, is a row of irregularly shaped yellow spots.

True legs moderately elongate, acuminate, 3-jointed and yellowish brown in hue, the tarsal joint being armed with a short, recurved, black claw: the whole slightly invested with short black hairs. The membraneous legs of the 3rd, 4th, 5th and 6th abdominal segments cylindrical, thickish, abruptly truncate at base, and clothed with short reddish brown hairs, and armed on the inferior aspect interiorly with a double row of stiff, ferruginous hairs, for adhering to objects. Anal pro-

leg sub-quadrangular, warty and pubescent, and surmounted by a triangular supra-anal plate of a dark purplish color, with the apex directed posteriorly.

Prothoracic and first and abdominal rings are furnished each with a pair of transversely oval, yellowish spiracles. Inferior aspect of the larva is marked with clusters of white spots, relieving the monotony of the purple. Last abdominal segment surmounted by a moderately long recurved horn, yellowish brown in color, and bearing scattered gland like bodies, which manifest a tendency to become spines. Length nearly 3 inches. Taken in Germantown during the first week of September, while feeding upon the leaves of *Polygonum pennsylvanicum*.

This larva, belonging, as it does, to the family Sphingidæ, is undoubtedly rare, as it is the only one that I have met with in all my entomological rambles; nor can I find in any of the works at my command a description, still less a figure thereof. In some respects it resembles the full-grown larva of *Sphinx euphorbia*, described and figured in "Transformation of Insects," by Dr. Duncan; in others it differs very materially therefrom. In the Euphorbia Sphinx the yellow points are scattered promiscuously over the dorsal and lateral surfaces of the body, but in the specimen under consideration they are arranged with some view to order. There is a still further resemblance in the irregular spots which flank the sides, just beneath the line of stigmata, and in the general color, the former being black, and the latter a rich dark purple. It differs from the former in being devoid of the three longitudinal lines of carmine tint, which is a prominent feature of it, and also in being more tapering anteriorly.

There is one character in the life history of this larva which struck me as peculiarly novel and interesting, and which deserves to be placed upon record. Instead of assuming the peculiar Sphinx-like attitude in a state of rest, (whence the popular name of Sphinx is derived), and which is so familiar to entomological students as well as the outside world, it curves its body, bringing the head and tail in close proximity, reminding one of the position which is so easily and readily taken by the larva of *Cimbex ulmi*, Reek.

It cannot be denied that this is its natural posture in a state of inaction. To assure myself that a position which seemed so natural and easy to the worm was not an occasional one, I was permitted in the

intervals of relaxation and freedom from duty, to give it prolonged and careful attention for many consecutive days. In not a single instance did it assume the attitude so eminently characteristic of the Sphinx family.

One other peculiar trait of its nature it was my happy fortune to observe. Caterpillars, as is well known, have a variety of ways for defending themselves against the annoyances and assaults of their enemies. While some are provided with hairs which act as irritating causes when brought into contact with highly sensitive surfaces, others are furnished with fearful looking spines which infuse a feeling of horror into their enemies, even when they have not the power to act as irritants. This species, presenting an almost perfectly smooth bodily surface, assuredly makes up from its lack of integumentary appendages, in being armed with a pair of powerful tridentate mandibles, which it uses freely and indiscriminately.

Hundreds of Lepidopterous larvæ have been handled with impunity by the writer, and this new method of self-defence, even where manifested, has been so slight as not to attract much attention. In this case the insect seemed unwilling to permit any familiarities. The softest touch of the finger was sharply resented. On one occasion the writer's finger was seized and held on to with such pertinacity, as to require considerable effort at extrication. The smart from this squeezing lingered for many minutes afterwards—a suitable punishment for his temerity. Even when laid upon the palm of the hand it continued its rapid twitchings from side to side, and with gaping jaws, as if still conscious of hidden danger, ready to vent the full measure of its infuriated passion upon anything that should come within their scope.

In conclusion, I am sorry to say that my *vivarium* having been unduly tampered with during my absence, this caterpillar, which was always exceedingly restless under confinement, effected its escape. On the discovery of the fact dilligent search was commenced, but no clue to its whereabouts could be obtained—it, doubtless, like many of its unfortunate kind, having become a rich morsel for some insect-loving bird. I trust to be able during the gradually approaching season to secure similar larvæ and bring them to the imago or moth condition.

HESPERIA PAWNEE. *N. sp.*

BY G. M. DODGE, GLENCOE, DODGE CO., NEBRASKA.

Male expands 1.45 inches. Primaries above fulvous. Subcostal, submedian and subdorsal veins black at the base. Stigma black and conspicuous, followed by a dusky shade. A small black line at the extremity of the disk is preceded by a yellowish white or semi-transparent spot in the disk; a similar spot, triangular in shape, appears between the first and second median veinlets at their divarication, and two others between the sixth and seventh subcostal veinlets. The outer margin is broadly bordered with brown, which is finely powdered with fulvous scales toward the apex.

Two nearly square fulvous spots between the last subcostal and first median veinlets, separate an oval brown patch that lies at the extremity of the disk, from the border. Costal edge blackish. Fringe white, dusky toward the apex.

Secondaries fulvous, bordered with brown; broadly and darkest along the anterior edge, narrowly on the outer edge, where it appears as cuneiform spots between the veinlets, and broadly again along the inner edge, where it is sprinkled with fulvous. Most of the veins on both wings are black. Underside of both wings pale yellow. Primaries black at base, having a black line corresponding to the stigma.

Inner margin brown, preceded by a large whitish patch. Five pale whitish spots near the apex, another in the disk, and one between the first and second median veinlets. Fringe white at the anal angle, brown tipped with white at the apex. Secondaries have a whitish spot in the disk, and are crossed by a nearly straight row of small whitish spots. Head and thorax greenish yellow. Body black. Abdomen, breast and palpi yellowish white. Antennæ black and yellow above, white tipped with chestnut below.

The spots on the underside of secondaries sometimes obsolete.

♀ light brown above, with a slight purplish reflection. Primaries sprinkled with fulvous scales near the base and inner angle. There is a large, square, white spot in the disk, and an unequal, curved row of nine white spots extend from the costa—beginning about two-tenths of an inch from the apex—to the submedian vein. The first three spots are narrow

and equal, the fourth and fifth are small and square and lie nearest the outer edge of the wing, the sixth is larger and triangular, the seventh largest and square, the eighth and ninth are irregular in shape and partly fulvous.

Secondaries darkest along the anterior margin. A curved row of five whitish yellow spots, of which the second and third are longest, crosses the wing beyond the disk, and in the disk is a small yellow spot. A yellow streak precedes the last median veinlet, running to the outer margin. Fringe of all the wings white. Below, on the primaries, the same white spots appear as above, except that the eighth and ninth are merged in a large whitish patch situated as in the male. A brown patch covers part of the base and inner margin, and extends to the center of the wing. On the secondaries three small white spots appear near the apex. The ground color of both wings is yellowish white, most deeply tinged with fulvous near the costal border of the primaries. Fringes white. Head, thorax and body brown above. Abdomen and palpi white. Antennæ black above, whitish tipped with red below.

This species was taken at Glencoe, Nebraska, upon high rolling prairie, from the first to the middle of September.

The writer can exchange a few males for United States diurnals, with those desirous of seeing the types.

LIST OF NEUROPTERA

COLLECTED BY J. PETTIT, GRIMSBY, ONT.

Psocus striatus,
Pteronarcys biloba?
Calopteryx maculata,
Lestes rectangularis,
" forcipata,
" unguiculata,
Agrion saucium,
" irene,
" ineis,
Aeschna constricta,
Plathemis trimaculata,
Libellula luctuosa,
Libellula 4-maculata,
" pulchella,
" semifasciata,
Diplax intacta,
" rubicundula,
Chauliodes pectinicornis,
" maculatus,
" angusticollis,
Polystoechotes punctatus,
Myrmeleon obsoletus,
Panorpa rufescens.

ON SOME OF OUR COMMON INSECTS.

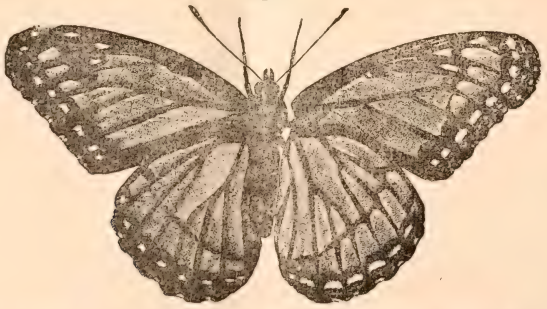
13. *THE DISIPPUS BUTTERFLY—Limenitis disippus*, Godt.

BY THE EDITOR.

In the annual report of the Entomological Society of Ontario, for 1872, this insect is referred to at some length, and from the material there given much of the following has been condensed. In the perfect or winged state it is tolerably common throughout Ontario, and in this condition it very closely resembles our common red or *archippus* butterfly, see CAN. ENT., vol. v, p. 4, from which, however, it may always be distinguished by its smaller size and by a black band which crosses the hind wings, which band is entirely wanting in the *archippus*.

Fig. 5 represents the *disippus* butterfly. The ground color of the wings is a warm orange red, with the veins heavy and black, and the margins spotted with white. In the figure the left wings represent the upper surface, while those of the right, which are slightly detached from the body, show the underside; the two surfaces differ but

Fig. 5.

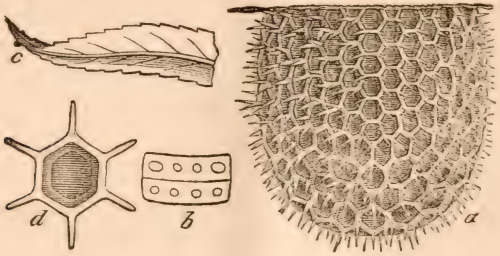


very little in color or markings. The butterfly appears on the wing rather late in the summer, when it may frequently be seen hovering about willow bushes, on which the female usually deposits her eggs, that being the favorite food plant of the larva.

The egg, which is well shown in fig. 6, is a very beautiful object; *a* represents it highly magnified, while at *c* it is shown of the natural size and in its usual position on a willow leaf. At *d* one of the minute cells

of the egg is shown still more highly magnified. Mr. C. V. Riley, who was the first to describe this egg, says that at first it is of a pale yellow color, but that it soon becomes gray as the enclosed larva develops. The

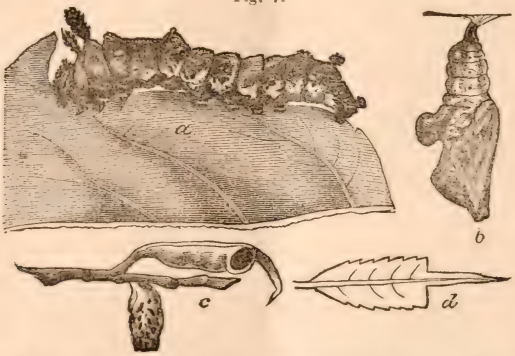
Fig. 6.



eggs are usually deposited singly near the tip of the leaf, generally on the under side, although sometimes on the upper, and occasionally two or even three are placed together.

In a few days the young larva appears. As it issues from the egg it measures only one-tenth of an inch long, has a large yellowish brown head, and a pale yellowish brown body, the latter with darker streaks and a few pale dots and warts, the warts having pale spines or bristles issuing from them. The larva attains full growth in about one month from the time of hatching, when it appears as shown at *a*, fig. 7. It is then about one inch and a quarter long, with a rather large head, which is flattened in front and divided by a central depressed line into two lobes, each of

Fig. 7.



which is tipped with a green tubercle or short horn. The head is of a pale green color, with two dull white lines down the front, and roughened with a number of small green and greenish white tubercles.

The body above is of a deep, rich green color, with patches and streaks of dull white ; the second segment is smaller than the head, and thickly covered with whitish tubercles ; the third segment, which is dull whitish green, is raised considerably above the second, and has a flat ridge above with a long brownish horn on each side of it thickly covered with very short white and brown spines ; the fourth segment has a similar ridge, with a small tubercle on each side, each tipped with a bunch of short whitish spines. All the segments behind the fourth have two tubercles, one on each side, of varying size and in a line with the long horns on the third segment, each being covered with a cluster of whitish spines. The tubercles on seventh, eighth, tenth and eleventh segments have a streak of white at their base, and each segment behind the fourth, excepting the ninth, has several smaller tubercles of a bright blue color. A large whitish patch covers nearly the whole of the ninth and parts of the eighth and tenth segments, and another of a similar character covers the second, third and part of the fourth. A white stripe extends along each side, close to the under surface, from the fifth to the terminal segments, in which is set a small cluster of whitish spines about the middle of each segment, from the sixth to tenth inclusive. On each side of the seventh, eighth and tenth segments is an elongated blackish spot, just above and behind the spiracles ; the latter are rather large, oval, and of a brownish black color.

The under side is whitish green, with a central dull white stripe on the hinder segments ; the feet are brown, ringed with brownish black ; the prolegs pale greenish, faintly tipped with brown.

The chrysalis, fig. 7, *d*, has a curious mixture of colors—brown, grey, flesh color and white—and is characterized by a remarkable, thin and almost circular projection sticking out from the middle of its back, which has been likened to a Roman nose.

There are two broods of this insect during the year ; the larvæ of the second brood scarcely attain half their growth when they hybernate, and complete their developement the following spring. On the approach of inclement weather the little caterpillar constructs a curious case in which to dwell, see *c*, fig. 7, which has been likened to the leaf of a miniature pitcher plant ; having first, by means of silken cords, firmly secured the stem of the leaf it uses to the twig on which it grows. These cases are frequently found upon willow bushes, and also on the American poplar during the winter season.

This butterfly is subject to the attack of several parasites ; one a tiny dark four-winged fly, infests the eggs ; another four-winged fly of a larger size, and a still larger two-winged fly attack the insect in its caterpillar state.

MICRO-LEPIDOPTERA.

BY V. T. CHAMBERS, COVINGTON, KENTUCKY.

Continued from Page 11, vol. vi.

ERRATA.—Ante v. 5, p. 229, for *Laruna* read *Laverna*.

DRYOPE, *gen. nov.*

Primaries lanceolate ; the costa enters the margin about the middle discal cell narrow and closed by a nearly straight discal nervure. The subcostal sends off a long curved branch from about its middle, and which attains the margin behind the end of the cell. From the end of the cell the subcostal bends somewhat obliquely upwards to the costal margin. The median is furcate from the end of the cell, both branches being short and bending somewhat suddenly downwards to the dorsal margin, the inner branch being straight and continuous with the discal vein. The discal vein emits five branches, the superior going to the costal margin, the next furcate before the tip with one of the branches to each margin ; the three others go to the dorsal margin.

Secondaries narrowly lanceolate, costal vein short, subcostal very long, simple, attaining the costal margin near the tip ; cell unclosed ; median vein with three nearly equidistant branches. No discal vein but an independent branch which arises near the median and attains the dorsal margin before the apex.

Head smooth ; vertex short and broad ; forehead obtusely rounded ; face smooth, narrow and much retreating ; tongue long, clothed at the base. No maxillary palpi ; labial palpi short, porrected, densely scaled, almost tufted beneath ; no ocelli ; eyes large, but partly concealed by some long scales pendant from the swollen basal joint of the antennæ, which are about two thirds as long as the primaries, with the joints closely set and microscopically pubescent.

This genus must approach closely to *Chauliodus*, Treit., but I can not reconcile either Mr. Stainton's or Dr. Clemens' diagnosis of the genus with the characters of this insect as to the labial palpi and neuration, nor do I discern any tooth-like projections of scales along the inner margin of the primaries. In ornamentation, too, the insect evidently approaches *C. canicinctella*, Clem. closely, though evidently distinct from it.

D. Murtfeldtella. N. sp.

Head, palpi, thorax and basal third of the primaries pale yellowish, the remainder of the primaries being of the same general hue, but darker and more reddish, the line between the two shades distinct (that is, they do not pass gradually into each other).

Al. ex. ½ inch. Kentucky in June. Also, received from Miss Mary E. Murtfeldt, of St. Louis.

In many specimens (which should, perhaps, be regarded as a distinct species) the colors are much more distinct, and the hue varies somewhat, the basal portion of the primaries having a pinkish cast and the remainder more of a brownish purple : some of the scales in the apical part of the wing tipped with hoary or pale yellow ; these specimens are also decidedly larger than the others.

OENOE, *gen. nov.*

Head and face rough, the tuft projecting in front ; tongue short, concealed by the palpi ; maxillary palpi long, folded ; labial palpi drooping, the second joint one-third longer than the third, and with projecting bristles at the apex ; eyes globose ; no ocelli ; antennae nearly two-thirds as long as the wings, filiform ; the terminal joints with the scales arranged in whorls, and the basal joint with a few long hair-like scales depending over the eyes.

Anterior wings lanceolate ; discal cell closed by a straight discal nervure ; costal vein short ; the subcostal from before the middle sends a branch to the margin behind the middle ; another short branch behind the middle, from the end of the cell, is slightly bent upwards to the margin ; the discal vein emits two branches from a common point : the upper branch attains the costal margin, the second branch sends a branch to the dorsal margin and becomes furcate before the tip, delivering a

branch to the costal and one to the dorsal margin. The median divides into two branches at the end of the cell, both branches going to the dorsal margin ; submedian simple, rather long.

Posterior wings linear lanceolate ; the costal margin is excised from about the middle to the tip ; the costal vein attains the margin at the excision ; the subcostal is nearly straight and attains the margin at about the apical fourth ; discal cell unclosed ; a disco-central nervule is faintly indicated through the cell, becoming distinct in the apical half of the wing, when it sends two branches to the dorsal margin and attains the costal margin just before the apex ; the median vein is coincident with the dorsal margin from the basal third to beyond the middle.

This genus is nearly allied to *Eudarcia*, *Diachorisia*, but especially to *Hybroma*, Clem., differing, however, from all somewhat both in the trophi and neuration.

O. hybromella. N. sp.

Palpi brown and silver gray intermixed ; head yellowish white ; antennæ grayish fuscous, becoming more silvery towards the tip ; thorax and basal half of the forewings maroon brown, with darker brown scattered scales and small spots ; remainder of the wing white, with scattered brown scales which upon the costa and in the apical portion of the wing are condensed into loose, rather large, irregular blotches. *Alar ex.* ½ inch. Kentucky.

PERIMEDE, *gen. nov.*

This insect is allied to *Stilbosis*, Clem., *Laverna*, &c. It was captured in my library, where it had most probably escaped from some of my breeding cages, but I can give no account of its larval history.

No maxillary palpi ; labial palpi slender, rather sparingly scaled, reaching the vertex, widely divergent ; antennæ faintly pectinated, more than half as long as the wings ; basal joint suddenly clavate towards the tip. Head and face smooth, with the scales appressed ; face rather broad.

Wings long and narrow, with long ciliae.

Primaries longer than the body, narrowly lanceolate. Discal cell closed, the discal vein giving off one branch to the posterior margin near the tip. The costal is very short. The subcostal sends two branches to

the margin before the end of the cell, one from the end of it and one behind the cell, and attains the margin just before the tip. The median sends three branches to the dorsal margin. (Probably the discal branch above mentioned should more properly be considered the terminal portion of the median and the discal described as having no branches.) Submedian simple.

Secondaries linear lanceolate. The costal vein is very long and close to the margin; the subcostal attains the tip, its basal half being obsolete. Discal cell unclosed; median sub-dividing into four equidistant branches, the first of which attains the dorsal margin before the middle, and the last one not far from the tip.

Imago long, slender, and the single species described below has small raised tufts of scales upon the primaries.

P. erranscila. N. sp.

Antennae grayish brown; face and palpi pale grayish, tinged with purple; primaries grayish brown, tinged with purple, with three small spots of raised black scales, the two first of which are margined behind and the third one before with pale ochreous; one of these tufts is near the dorsal margin before the middle, one about the middle of the disc, and one at the end of it. Under surface and legs whitish, with four distinct dark brown spots on each side of the abdomen, and the joints of the legs gray brown. *Al. ex.* nearly ½ inch. Kentucky.

LIST OF COLEOPTERA OF ST. LOUIS COUNTY, MISSOURI.

BY S. V. SUMMERS, M. D., NEW ORLEANS,

(Continued from Page 192, Vol. v.)

EUAESTHETUS, *Grav.*
americanus, *Er.*
OXYPORUS, *Fab.*
vittatus, *Grav.*
OSORIUS, *Latr.*
latipes, *Er.*

BLEDIUS, *Steph.*
semiferrugineus, *Lec.*
troglodytes, *Er.*
pallipennis, *Er.*
fumatus, *Lec.*
nitidicollis, *Lec.*

BLEDIUS, *Steph. (continued)*
annularis, *Lec.*
analis, *Lec.*
OXYTELUS, *Grav.*
insignitus, *Grav.*
sculptus, *Grav.*
nitidulus, *Grav.*
PLATYSTETHUS, *Mann.*
americanus, *Er.*
TROGOPHLOEUS, *Mann.*
morio, *Er.*
insculptus, *Fauvel.*
ANTHOPHAGUS, *Grav.*
brunneus, *Say.*
ACIDOTA, *Steph.*
subcarinata, *Er.*
OLOPHRUM, *Er.*
rotundicolle, *Er.*
emarginatum, *Er.*
LATHRIMAEUM, *Er.*
sordidum, *Er.*
CORYPHIUM, *Steph.*
notatum, *Lec.*
GLYPTOMA, *Er.*
costale, *Er.*
LISPINUS, *Er.*
laevicauda, *Lec.*

HISTERIDÆ.

HOLOLEPTA, *Payk.*
fossularis, *Say.*
HISTER, *Linn.*
binotatus, *Lec.*
interruptus, *Beauv.*
depurator, *Say.*
abbreviatus, *Fab.*
americanus, *Payk.*
bimaculatus, *Linn.*
carolinus, *Payk.*
lecontei, *Mars.*
immunis, *Er.*
foedatus, *Lec.*
harrisii, *Kirby.*
sedecimstriatus, *Say.*
PHELISTER, *Mars.*
subrotundus, *Mars.*
vernus, *Mars.*
TRIBALUS, *Er.*
americanus, *Lec.*
EPIERUS, *Er.*
pulicarius, *Er.*
regularis, *Lec.*
BACANIUS, *Lec.*
punctiformis, *Mars.*
DENDROPHILUS, *Leach.*
punctulatus, *Lec.*
PAROMALUS, *Er.*
affinis, *Lec.*
bistriatus, *Er.*
conjunctus, *Lec.*
SAPRINUS, *Leach.*
assimilis, *Er.*
seminitens, *Lec.*
patruelis, *Lec.*
fraternus, *Lec.*
ACRITUS, *Lec.*
politus, *Lec.*
fimetarius, *Lec.*
exiguus, *Lec.*

SCAPHIDIIDÆ.

SCAPHIDUIM, *Oliv.*
piceum, *Mels.*
4-guttatum, *Say.*

SCAPHIDIIDÆ *(continued).*

CYPARIUM, *Er.*
flavipes, *Lec.*
SCAPHISOMA, *Leach.*
convexum, *Say.*
suturale, *Lec.*

TOXIDIUM, *Lec.*
gammaroides, *Lec.*
compressum, *Zimm.*

TRICHOPTERYGIDÆ.

TRICHOPTERYX, *Kirby.*
haldemani, *Lec.*

PHALACRIDÆ.

PHALACRUS, *Payk.*
politus, *Mels.*
OLIBRUS, *Er.*
apicalis, *Lec.*

OLIBRUS, *Er. (continued.)*
nitidus, *Lec.*
bicolor, *Er.*
pusillus, *Lec.*

NITIDULIDÆ.

CERCUS, *Latr.*
abdominalis, *Latr.*
COLASTUS, *Er.*
truncatus, *Lec.*
morio, *Er.*
semitectus, *Er.*
CARPOPHILUS, *Leach.*
pallipennis, *Lec.*
hemipterus, *Steph.*
antiquus, *Mels.*
luridus—
CONOTELUS, *Er.*
obscurus, *Er.*
EPURAEA, *Er.*
helvola, *Er.*
vicina, *Lec.*
NITIDULA, *Fab.*
bipustulata, *Fab.*
ziczac, *Say.*

PROMETOPIA, *Er.*
sexmaculata, *Er.*
OMOSITA, *Er.*
colon, *Er.*
PHENOLIA, *Er.*
grossa *Er.*
STELIDOTA, *Er.*
geminata, *Er.*
octomaculata, *Lec.*
AMPHICROSSUS, *Er.*
ciliatus, *Er.*
PALLODES, *Er.*
silaceus, *Er.*
CRYPTARCHA, *Shuck.*
ampla.
IPS, *Fab.*
fasciatus, *Say.*
4-signatus, *Say.*

MONOTOMIDÆ.

BACTRIDIUM, *Lec.*
nanum, *Lec.*

MONOTOMA, *Hbst.*
americanum, *Aube.*

TROGOSITIDÆ.

NEMOSOMA, *Latr.*
cylindricum, *Lec.*
TEMNOCHILA, *Westw.*
viridicyanea, *Lec.*
virescens, *Er.*
ALINDRIA.
cylindrica, *Er.*
teres, *Lec.*

TROGOSITA, *Oliv.*
mauritanica, *Oliv.*
corticalis, *Mels.*
dubia, *Mels.*
nana, *Mels.*
castanea, *Mels.*
laticollis, *Horn.*
bimaculata, *Mels.*

COLYDIIDÆ.

DITOMA, *Ill.*
quadriguttata, *Lec.*
SYNCHITA, *Hellwig.*
granulata, *Say.*
nigripennis, *Lec.*
AULONIUM, *Er.*
parallelipipedum, *Er.*

PROLYCTUS, *Zimm.*
exaratus, *Mels.*
CERYLON, *Latr.*
unicolor, *Lec.*
castaneum, *Say.*

A DISSERTATION ON NORTHERN BUTTERFLIES.

BY WILLIAM COUPER, MONTREAL.

(Continued from Page 37).

The confinement of the genus *Chionobas* to high latitudes affords an example regarding distribution of species. Their food being lichens peculiar only to the Alpine regions, must confine them within a limited range. Mr. Scudder, in his "Revision of the hitherto known species of the genus *Chionobas*, of North America"—Proceed. Ent. Soc. Philad., vol. 5, pp. 26-28—gives them three or four localities; but these are either arctic, sub-arctic or Alpine. He places them also in Alpine districts—on

high mountains in temperate latitudes in Europe and America. Mr. Scudder asks "what relations of structure do the species of these different localities and varying range of habitat bear to one another?"

Specific relations are just what we want to have elucidated, but it is difficult to obtain material for this work while butterflies of the genus *Chionobas* are confined to frigid, unaccessible localities. Mr. Scudder deserves the gratitude of entomologists for his able Revision of the *Chionobas*, and in defining the species known to occur in our Northern and Alpine regions. I may here remark that I did not see a species of this genus during my two visits to Anticosti, and I cannot account for their absence from the island.

After returning from Labrador in 1867, I sent Mr. Scudder ♀ specimens of a *Pieris* taken on the south coast of the Lower St. Lawrence, at Natashquan. His answer, dated Oct. 1st, 1867, is as follows: "*Pieris:* "I am inclined to think this is *P. frigida*, Scudd., described from Upper "Labrador, but I cannot be positive without seeing some ♂ ♂ from your "collection." I had no ♂ ♂ at that time, and therefore could not send them; but I took it for granted that the species was his *Pieris frigida.*

I made a subsequent collection on the Island of Anticosti and Labrador, in 1872, and captured a number of the above *Pieris* at Fox Bay, as well as on the south coast of Labrador. The specimens were distributed to my subscribers under the name of *P. frigida*, according to Mr. Scudder's determination. The gentlemen receiving the species (all reputed entomologists) did not doubt that it was anything else than Scudder's *P. frigida* until my return from Anticosti this year. I am now informed by Mr. Grote that the *Pieris* is not *frigida*, but *Ganoris oleracea* var. *borealis*.

Now, I have before me Mr. Scudder's paper in Proceed. Boston Soc. of Nat. Hist., vol. viii, Sept., 1861, in which I quote as follows:

"*Pieris oleracea*, Boisd.
"*Pontia oleracea*, Harris.
"*Pieris cruciferarum*, Boisd.
"*Pontia casta*, Kirby.

"The butterflies described by Harris, Boisduval and Kirby under the "above-mentioned names are one and the same insect. It is found "inhabiting the northern and eastern portions of North America, reaching "rarely as far south as Pennsylvania, and extending eastward to Nova

"Scotia, at least as far west as Lake Superior, while in the North it is "found as high as the Great Slave Lake in the Hudson Bay Company's "territory, and even, according to Kirby, to Latitude 65° N. on the "McKenzie River."

I have now the mortification of finding that my Anticosti specimen of what I claim to be a *Pieris* is now *Ganoris oleracea;* but a var. to be called *borealis*. Mr. Grote says that the species resembles *frigida*, but that the peculiar elongated wings of *frigida* are wanting.

With a knowledge of the history of the Anticosti *Pieris* or *Ganoris*, whichever it may be, I am prepared to state that the former does not agree with the habits of *Pieris oleracea*, which is double brooded in Canada and quadrupled in the south, while that of Anticosti has but one brood during the season.

The egg of *oleracea* is pear-shaped or oval, of a yellow green color, and ribbed longitudinally with about fifteen sharp edged lines. The eggs are deposited singly, rarely more than one on a leaf, on the *underside*. The egg of the Anticosti *Pieris* is not pear-shaped, but oblong, pointed at each end, flesh colored, smooth and without ribs. The insect never deposits eggs underneath the leaves, but on the upper surface of its food plant *(Turritis stricta)*, and I have counted six on a single leaf. The caterpillar of the Anticosti *Pieris* is also different from that of *oleracea*. It approaches the color of that of *P. rapæ*, but without dorsal or lateral stripe, and is pubescent. In fact, it is as different from *oleracea* as the caterpillar of the latter is from *rapæ*. It occurs to me that the argument I have advanced regarding the *Papilio* of the Island applies also to this Anticosti *Pieris*. I find that after examining a number, with few exceptions, the colors are constant; and I cannot agree with Mr. Scudder that the upper surface is "supplied with obsolete spots similarly situated to "those on the upper surface of *P. rapæ* of Europe."

It is possible that the *Pieris oleracea* of the south and west may be but races of this northern form. Mr. Scudder says that "No possible "step in the gradation from one extreme to the other is wanting, and both "extremes are found equally among numerous examples from as widely "distant places as Massachusetts and the Great Slave Lake; although "the suite of specimens with which I have made my comparisons seems "to indicate that the paler forms are more commonly met with in the "more southern localities, and that more heavily marked ones are the "characteristic forms of the north."

Mr. Scudder, speaking of a white butterfly taken in Eastern Labrador, says that it is very closely allied to, but distinct from *P. oleracea.* In a note following the description of *P. frigida*, he adds: "It would be "exceedingly difficult to distinguish this species except by immediate "comparison with both sexes of *oleracea;* the differences are more easily "seen than described, although the extreme limits of variation of *oleracea* "do by no means permit us to include within its boundaries this com- "paratively persistent form; it is more heavily marked than any specimen "of *oleracea* which I have seen."

The *Pieris* which Mr. Grote has named *Ganoris borealis* is found along two hundred miles of sea-coast on Anticosti; it is quite abundant on the north shore of the Gulf, terminating in a western direction in the neighborhood of Seven Islands. It occurs throughout the north, on the Labrador Islands, into the Straits of Belle Isle, and probably Newfoundland. I am aware that *P. oleracea* occurs at Quebec, and it may extend on both sides of the St. Lawrence opposite the mouth of the River Saguenay; but it is not found below the latter river, towards the Gulf. It seems curious that *Pieris frigida* or *Ganoris borealis* should, like *Papilio brevicauda*, be confined to the north coast and islands of the Gulf of St. Lawrence, and that the caterpillar of the Anticosti *Pieris* is differently marked and the habits of the butterfly contrary from that of *oleracea.* What is the object of the study of eggs and larvæ of insects? Is it not for the purpose of determining the value of species?

The object in claiming primitive source for some of the northern butterflies, arises mainly from the fact that in them we discover permanency in form and color, while their geographical range is limited in accordance with the distribution of their food plants. That species found scattered over defined circuits are generally tending towards the equator. That many of these are but figurative races removed from their original habitat, and have varied through the influence of food and climate.

In this connection I quote an extract from Geographical Distribution of some Genera of Insects, by Francis Walker, F. L. S., Vol. iv, No. 10 of CAN. ENT.: "In studying the fauna of a mountain it is most suitable "to begin with the top, and to trace it downward, where the agencies or "forms of life become successively more numerous and complicated in "their mutual adaptations and limitations, all being as wheels which serve "to regulate the great living mechanism of which they are the parts. In "like manner, in noticing the faunas of the two primary mountains into

"which the earth is divisible, their summits being the poles and the "equator their common base, it is advisable to begin with the arctic "species or with those which have ascended to the highest latitudes. The "difference in soil, in vegetation and in elevation facilitate or hinder the "migration and settlement of insects, and help to effect the variety of "distribution, which is one of the chief attractions in the aspects of "nature."

MONTREAL BRANCH OF THE ENTOMOLOGICAL SOCIETY OF ONTARIO.

This branch was organized November 11th, 1873. The following officers were elected for the ensuing year :—President, W. Couper ; Vice President, M. Kollmar ; Secretary-Treasurer, F. B. Caulfield ; Council—G. J. Bowles, P. Knetzing, C. W. Pearson, W. Hibbins, jr.

The meetings of the Society are held at the residence of the President, No. 67, Bonaventure Street, Montreal, on the first Wednesday evening in each month.

ENTOMOLOGICAL COLLECTING TOUR.

We would call especial attention to a notice of an Entomological collecting tour about to be undertaken by Dr. S. V. Summers, of New Orleans, La., which will be found on the outside page of cover of our magazine. This is one of the most extensive undertakings of the sort we have ever heard of, and is well worthy of the patronage of Entomologists. The number of specimens guaranteed is extremely liberal, and the returns will no doubt well repay those who invest in the proffered shares. We are duly authorized by Dr. Summers to receive monies for shares on his account, so that any of our readers who may prefer negotiating with us will please communicate with our Secretary, Mr. J. H. McMechan.

TO OUR PATRONS.

At a special meeting of the Council of the Entomological Society of Ontario, held on the 19th of February, 1874, Mr. J. Williams, being about to remove to Montreal, tendered his resignation as Secretary-Treasurer, which was accepted with regret. Mr. J. H. McMechan having kindly consented to undertake the duties of the office, was unanimously elected as his successor. Our friends and correspondents will please bear this change in mind, and address all remittances and business communications to J. H, McMechan, Secretary-Treasurer, London, Ontario.

CORRESPONDENCE.

PIERIS RAPÆ.—About the last of September, 1873, I netted the first Rape Butterfly that I have ever seen in this part of the country—township of Dunn, county of Haldimand. It is a male butterfly, as described fig. 8, vol. 5, No. 3, CANADIAN ENTOMOLOGIST.—F. C. L.

VANESSA G. ALBUM.—I have lately received from the north-west coast of British America a specimen of *Vanessa G. album.* I do not remember hearing of its being found so far from the Atlantic before—W. H. EDWARDS.

BOOK NOTICES.

Illustrations of the Zygaenidæ and Bombycidæ of North America, by R. H. Stretch, San Francisco, California. Parts 8 and 9, with three colored plates.

The Cincinnati Quarterly Journal of Science, Vol. i, No. i, 8vo., pp. 96.

Catalogue of the Phalaenidæ of California, No. 2, by A. S. Packard, jr., M. D., 8vo., pp. 40, with one photograph plate. From the Proceedings of the Boston Soc. Nat. Hist., Vol xvi.

Nature, to February 12, 1874.

Science Gossip, February, 1874.

Newman's Entomologist, February, 1874.

The Zoologist, February, 1874.

Le Naturaliste Canadien, Fevrier, 1874,

The Western Rural, Chicago, to March 7, 1874.

Prairie Farmer to March 7, 1874.

Indiana Farmer to Feb. 28, ,1874.

Canada Farmer, to March 2, 1874.

Maine Farmer to Feb. 14, 1874.

The Canadian Entomologist.

VOL. VI. LONDON, ONT., APRIL, 1874. No. 4

NOTES ON THE LARVA AND PUPA OF SAPERDA MOESTA, LEC.

BY THE EDITOR.

On the 25th of March, 1873, I received from P. E. Bucke, Esq., P. O. Dep't, Ottawa, a bundle of twigs of the Balm of Gilead tree (*Populus balsamifera*), containing larvæ of *moesta*. These larvæ were very thickly set in the branches, in many places not more than an inch or two apart and situated chiefly at the base of the buds, where the presence of an occupant was indicated by a swelling in the branch, surmounted by a dark brown patch of partly decayed bark. The castings and debris of the food were of a light orange color, and were pushed forward, stuffing the swollen part. The whole length of the excavation made by each larva did not usually exceed an inch, and so much of this towards the front was filled with debris, that the clear space left was very little larger than its body.

The body of the larva was nearly cylindrical, tapering a little posteriorly, and about half an inch in length.

Head very small, dark reddish brown in front, with a pale streak down the centre. Color pale behind; jaws black.

Body above deep yellow, with a glossy surface, sprinkled with very minute short yellow hairs, invisible without a lens. Second segment above and below a little deeper in color, and more horny looking than the other segments; interspaces between segments strongly indented. There was a depressed dorsal line not different in color from the rest of the body, but sunken, and on each side of it the projecting rings of the body were somewhat flattened. Spiracles pale brown, rather small. Terminal segment a little more hairy than the others.

The under surface was similar in color to the upper. I was not able to detect any trace of feet, although a careful examination was made with a lens.

No further observations on these larvae were made until May 2, when I expected to find them in the chrysalis state, but was surprised to find in the several cells I opened that no pupal enclosure was to be seen, but that the head, antennae and legs were fully developed, while the wings and wing cases were only partially so. The wing cases, which covered the membraneous wings, were not more than one-eighth of an inch long, and projected out over the sides, spreading almost free from the body. At their base they were yellowish and semi-transparent, while from about the middle to the base they were black and covered with the usual small granulations. The scutellum was indicated by a short black streak widening anteriorly, while behind this the body was of a dirty yellow color and soft, flabby consistence. This color and consistence prevailed below also, behind the base of the legs, while about and anterior to them the color was black. The insect could move its legs, but was very sluggish and did not seem disposed to move at all unless disturbed; at this stage it was incapable of walking. Several of the chambers, which had been opened with care, were closed and tied up with their occupants in them; these were examined again on the 9th of May, when the abdomen was found to have decreased in size and become uniformly dark, almost black below, with the surface roughened, but still yellow at the tip. Above there was a large black patch behind the scutellum, covering nearly one-third of the body, and another large black spot near the tip, covering the 10th and 11th segments, while the interspace between these two segments was of a dark greenish hue; the elytra had lengthened so far as to cover about two-thirds of the abdomen. The beetle was more active now, and able to walk, although with difficulty.

On the 16th of May the wing cases of one were found of full length, but not fully expanded so as to cover the body, while in another case they were fully developed. The twigs containing these insects had been allowed to remain in a dry room without any means being taken to keep them moist, hence they had become quite dry and brittle. On the 24th of May a fresh bundle of twigs was received from Mr. Bucke, and in these, while the greater number appeared to have been eaten by woodpeckers, some five or six specimens were found in a state of chrysalis one cell was occupied by the pupa of some parasite.

The chrysalis was nearly half an inch long. Body semi-transparent; color uniform pale yellow, excepting the eyes and enclosed mandibles, which were black; the knee joints were faintly tipped with brown, and a faint brown line down each side of the scutellum. All the parts of the insect were plainly visible through the pupa case. The wings were very small and diverged to each side of the scutellum in a similar manner to that described on the 2nd of May.

On the 29th of May two of these which had been seen as pupae on the 24th, had become perfect beetles; another had its wing cases green, but its abdomen was yellow and soft; two others were still unchanged pupae. Early in June all were perfected, the beetles having escaped from their enclosures by gnawing a neat round hole through the twig, just large enough to allow of the passage of the body.

Possibly the insects I examined on the 2nd of May might have already passed through their pupa stage, and their subsequent slow developement have been due to the altered condition of the twigs containing them, owing to the dry atmosphere in which they were kept.

OBSERVATIONS ON FORMICA FLAVA, AND INFERENCES DEDUCTED THEREFROM.

BY THOMAS G. GENTRY, GERMANTOWN, PA.

During the latter part of the month of May, of the spring of 1873, while reclining upon the ground beneath the shade of a tree growing on the outskirts of a thicket, the sun at the time beaming in all its glory and splendor overhead, my attention was suddenly arrested by the activity and excitement presented by a nest of the ordinary yellow ant, *Formica flava*. Scattered promiscously upon the earth before me were numberless larvae in various stages of developement, and not a few of immobile pupae, brought up from their subterranean domiciles by their ever active and thoughtful nurses to receive the life-sustaining benefits of the sunlight, while here and there were a dozen or more of ants that had but recently escaped from the prison-houses in which they had been confined —frail, to be sure, and with a pallid, death-like appearance, in conse-

quence of their long imprisonment, basking in the warmth of the sun to dry their bodies and to give color and tone to their systems, preparatory to entering upon the duties of the *formicarium*.

The full-grown neuters were the very pictures of restlessness. Consternation was evidently written upon their looks, if I may be permitted so to speak, and clearly evidenced in their hasty and dubious movements. The ova, larvae and pupae were being carried away to places of security beneath the ground, or hustled away to the neighboring grasses, in short, wherever their nurses could find safe and comfortable quarters for them.

Looking around me to find the cause of all this turmoil, my eyes soon rested upon two or three individuals of *Formica subterranea*, Lat. which had intruded their unbidden presence into this peaceful and hitherto happy family. There is no doubt that these ruthless invaders of this flourishing oasis of ant-life, were bent upon plunder or slaughter.

If pillage was their motive, these giants no doubt soon learned that if their weaker, more distant kin were unable to cope with them in strength, they could assuredly make up for its loss in stratagem, sagacity and numbers.

Not daring to attack their more powerful neighbors, after having sheltered the more tender, and being unable to defend their comrades who had just attained perfection and who were necessarily impotent, or to carry them to places of safety in view of their weight, in order to defeat the plans of the foe they set to work and destroyed those upon which but a few days before they had lavished the most endearing attentions.

While the major part of the workers were engaged in looking after the wants of the immature, and manifesting a readiness to provide for their further safety, should necessity demand it, a few were observed running about seizing in their mandibles the newly developed, not to bear them beyond the reach of danger, as was at first supposed, but to save them a life of servitude mayhap, at any rate to keep them from falling a living prey to the rapacity of the enemy.

Knowing by experience the sympathy and affection which the nurses ever bear towards these frail and tender objects of their care, this act of inhumanity, so to speak, struck me as peculiarly novel and astonishing. Prompted by curiosity to know the nature of the wounds inflicted, I raised a still struggling being up, and having placed it upon the palm of

my hand, made a careful examination of it by the aid of a small pocket microscope of twenty diameters. On the superior and inferior aspects of the abdomen, between the second and third semites, were observed two deep wounds which met each other in the interior, the mandibles having penetrated completely.

Several instances of the kind occurred. It cannot be assumed that these wounds were purely accidental. It might be possible that accidents of the kind would occur once in a long time through inexperience, but to argue that insects so habituated to such manipulations as the neuters assuredly are, would be likely to make such mistakes, when it is known —especially in the case of larvae, whose integuments and tissues are so delicate and yielding by reason of early age, that the greatest caution is necessary, is, in the estimation of the writer, perfectly preposterous. Admitting, for the sake of argument, an occasional occurrence of the kind, a successive repetition of it could hardly be justified. But on the ground that a purpose is thereby subserved, there is no doubt the object had in view is justified by the means employed for its accomplishment.

What this purpose is the writer will endeavor to show in a few carefully drawn opinions. It is a well established fact, as an abundance of well authenticated instances could be cited by the writer confirmatory thereof, that many animals of many families and orders, both in the domesticated and undomesticated conditions, are wont to destroy their disabled and wounded comrades. In wild animals, in many cases, the destruction seems to be warranted in order to preserve the herd or pack from the close pursuit of enemies. Mr. Charles Darwin, in his work entitled "Origin of Species," if I mistake not the work, remarks that "Instinct or reason may suggest the expelling an injured companion, lest "beasts of prey, including man, should be tempted to follow the troop."

In tame animals, of which some well authenticated examples are recorded in the case of the hog, cow, &c., the habit is undoubtedly one which affords a beautiful and forcible illustration of what is known as the "survival of instincts."

Audubon, in writing of the Wild Turkey (*Meleagris gallopavo*), which is found in great abundance in the far West, observes substantially that the old males in their marches often destroy the young by picking the head, but do not venture to disturb the full-grown and vigorous. The feeble and immature being an encumbrance to the party, it is obvious that their destruction would tend to the latter's preservation. Should

they be actuated by sympathetic and affectionate emotions, it is evident that the constant watchfulness and attention which the weak would demand, would necessarily retard the rate of their movement, and doubtless lead to the destruction of the entire flock. Here it is plain to the most obtuse intellect that instinct or reason, the latter, as I conceive it to be, operates for individual and family good.

Granting that instinct or reason does sometimes act for individual and family preservation, in the manner described, the writer does not feel at liberty to admit that in every case that may arise in which the weak and disabled are sacrificed, that it is done for the material benefit of the physically able and robust. How the destruction of the weak and newly developed ant can result in good to the colony, it is difficult to conceive in view of the fact that not the slightest effort to escape the danger by continued flight is undertaken, the sole object being to hide the immature away from impending danger, either in the natural galleries or underneath adjoining objects. A vigilant and powerful enemy, under these circumstances, would have very little difficulty in carrying out the very spirit and letter of his programme.

There seems to be one of two theories for the writer's selection wherewith to account for in anything like a satisfactory manner, this strange and abnormal habit upon the part of an insect which has been proverbially distinguished for its kind and affectionate disposition towards the tender beings committed to its trust—either to attribute it to an utter unwillingness and repugnance to witness its *proteges* made the servants of a hostile race, or to the survival and exhibition of a habit which was in vogue far back in the buried ages of the past, when this species of *Formica* was migratory or of a roving disposition.

That a feeling of utter repugnance sometimes takes possession of the nature of some forms of animal existence, when the objects of their solicitude and care are or are about to be reduced to a state of confinement, and impels them to a course of action which bears the semblance of inhumanity, will be patent to all from what follows.

In the summer of 1873 a friend of the writer's having procured a pair of the young of *Turdus migratorius*, Linn., placed them in a cage and hung the latter on a tree, close to his dwelling, where the parent birds could still administer to their temporal well-being. All went well for several days, and the parents, who had busied themselves in the intervals of feeding in their attempts to relieve their offspring, finding all their

efforts fruitless and ineffectual, flew away, but returned shortly afterwards bearing in their bills objects of a green color, most probably worms of poisonous qualities, fed them to the young and left, never to return. A few minutes afterwards the latter were dead.

It is evident from the above that the parents, finding their efforts of no avail to relieve their young from their imprisoned condition, sought this way of saving them from a life in preference to which death would assuredly prove desirable. Other instances might be cited, but I forbear Enough has been written to sustain the writer's position, that in the case of *Formica flava* an unwillingness to suffer any of the colony to undergo a life of slavery was the controlling motive in the sacrifice alluded to.

If it could be shown in the above cases that any material good was subserved thereby, or that any advantage was acquired, the author would be free to admit that Mr. Darwin's theory to account for the destruction was the only one competent to explain all the known facts. But from the foregoing statements it is evident that a desire to save their offspring and *proteges*, on the part of parents and guardians, from the condition of involuntary servitude, no doubt is equally as important.

ON SOME OF OUR COMMON INSECTS.

14. *THE COMMON COCKCHAFER—Lachnosterna quercina*, Knoch.

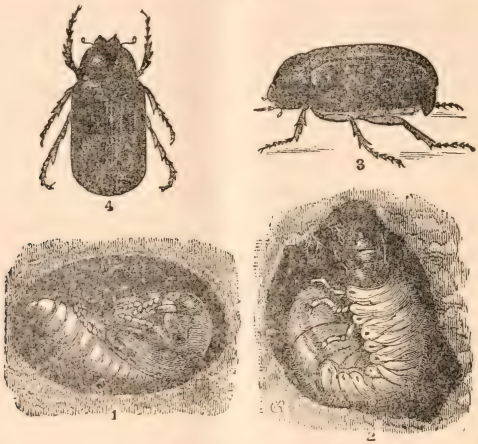
BY GAMBLE GEDDES, LONDON, ONT.

Our readers will recognize at once in figure 8, *(Lachnosterna quercina)* the common May-bug in its different stages. 1 shows the chrysalis; 2 the larva, and 3 and 4 the perfect insect. It appears in some years in vast numbers, and is greatly complained of, whilst in other seasons it is comparatively rare. This depends chiefly on the long duration of its developement. The insect flies with a humming noise, so that one is aware of its approach at the distance of some yards. It appears principally in May and the beginning of June, and feeds upon

several trees, amongst which may be mentioned particularly the cherry tree, as well as the oak, beech, maple and poplar. It is entirely nocturnal in its habits, and during the day time is sluggish and seeks shelter under boards and logs.

The perfect insect is of a chestnut brown color on the back, with a smooth and shining coat. Underneath it is of a lighter shade of brown.

Fig. 8.



After the pairing of the sexes the male soon dies, and the female burrows into the earth about nine or twelve inches, where she deposits 60 or 70 eggs, after which she comes out and lives but a very short time. These eggs are soon hatched into small white grubs, which commence almost immediately to feed upon the rootlets of plants. As they grow the larvae become great enemies of the agriculturist. When they are hatched they are just in time for the tender vegetation of early summer.

In appearance the larva is of a white color, with a light brown head, and when full grown is about the size of one's little finger. They are constantly turning up when digging and gardening are going on, and crows and other birds will often follow the plow to pick up the white grub, to which they are very partial.

At the end of the third summer the grubs stop feeding and bury themselves deep in the ground, where, in an oval cavity, the change to the chrysalis state is accomplished.

In this condition it remains for a variable period, and then appears the perfect insect, which works its way up by degrees to the surface of the ground.

In the Report of the Entomological Society for 1872, Mr. Saunders says, in reference to this insect:

"Every one must be familiar with the May-beetle, or May-bug, as it is sometimes called, a buzzing beetle, with a rapid but wild and erratic flight, which comes thumping against the windows of lighted rooms at night, in May and early in June: and when the windows are open it dashes in without a moment's consideration, bumping itself against walls and ceilings, occasionally dropping to the floor, then rising again suddenly, it sometimes lands unexpectedly against one's face or neck, or it may be, on one's head, where its sharp claws get entangled in the hair and its further progress is stayed until a forcible removal takes place. At such times it is quite a terror to those whose nerves are weak.

"Although thousands of these summer's evening tormentors are yearly, yea, nightly trodden to death during their brief season, yet thousands of others rise to supply their places, and sometimes they are reinforced by armies of tens of thousands. Then it is that oftimes serious damage is done to trees, whose foliage they consume, their powerful and horny jaws being admirably adapted for cutting and grinding the leaves. Cherry trees are frequently injured in this way, indeed these beetles are not at all particular as to what they eat; the oak, the Lombardy poplar and many other kinds of trees are just as readily attacked, if in their way."

ON MR. COUPER'S COLLECTIONS OF LEPIDOPTERA MADE ON ANTICOSTI ISLAND IN 1873.

BY AUG. R. GROTE,

Curator of Articulata, Buffalo Soc. of Natural Sciences.

The butterflies collected by Mr. Couper have been already enumerated in the "Bulletin of the Buffalo Society of Natural Sciences." They were: *Vanessa atalanta*, *Argynnis atlantis*, *Phyciodes tharos*, *Glaucopsyche Couperi*, *Cyaniris lucia*, *Ganoris oleracea* var. *borealis*, *Papilio brevicauda* and *Cyclopides mandan*. The moths, as far as the Geometridæ, have been determined by me and were as follows:

Alypia Langtoni, Couper.

Fourteen ♂ and two ♀ specimens received. The males are eight-spotted, the females six-spotted. The male is correctly described by Mr. Couper in the *Can. Nat.* It is only with difficulty that it can be separated from the male *A. octomaculata.* It appears to differ by the parallelism of the inferior edge of the basal sulphur spot on the fore wings with the margin of the wing; in *octomaculata* this spot is oblique. Neither the vine nor Ampelopsis grow on Anticosti, and Mr. Couper states that he has observed *A. Langtonii* ovipositing on the stems of grasses. I have formerly determined a specimen of *A. Langtonii* ♂, from Anticosti, sent me by Mr. Strecker, with other species of the genus, as *A. 8-maculata.*

Haemorrhagia uniformis, (G. & R.)
Hyles chamaenerii, (Harris.)
Lethia gordius, (Cramer.)
Trochilium, *sp.*

Ten specimens of a species that I do not venture to describe on account of the number of unidentified descriptions extant in the group.

Platarctia parthenos, (Harris.)

As early as 1864, I drew attention to the probability of Mr. Moeschler's *Arctia borealis* being identical with the present species, as also to the fact that Mr. Moeschler's papers on the Lepidoptera of Labrador had been written without reference to Kirby or the writings of American Entomologists. It is unfortunate for Mr. Moeschler that Mr. Strecker, whose acquaintance with entomological literature is so slight, should have been selected to make an unnecessary correction. Until Dr. Packard's later separation of the two species is properly contradicted, I do not understand why they should not be separately cited in a catalogue. Mr. Couper collected a single female specimen in fine condition, which seems only to differ from Mr. Moeschler's figure by the collar not being all red as Mr. M. paints it, aside from the sexual characters and the greater size. But Mr. Moeschler's description accords perfectly with my specimen where his figure contradicts it. So far as I can see, my specimen in no way essentially contradicts Harris' original description and figure in Agassiz's "Lake Superior." It is evident, however, that Dr. Packard separates an allied species from *P. parthenos*, as the *borealis* of Moeschler. Without having seen the material upon which Dr. Packard's two descriptions are based, it is useless for me to express any further opinion.

Arctia virguncula, (Kirby.)

A specimen in fine condition. Except that the figures are smaller, Mr. Moeschler's representation of *speciosa* does not seem to me to differ. I again repeat, provoked by Mr. Strecker's ill-advised remarks, that I called the attention of American Entomologists to this fact in 1864, and it seems to me that to be now charged with an ignorance of Mr. Moeschler's errors, when they were published by me ten years ago, is very absurd and shows merely that Mr. Strecker's knowledge of American Entomological works is not greater than that of Mr. H. B. Moeschler.

Phragmatobia rubricosa, (Harris.)

Habrosyne scripta, (Gosse.)

Thyatira pudens, Guenee.

The single specimen is rubbed and appears to have the spots on the forewings more greyish than usual. It expands 48 m. m.

Agrotis gilvipennis, Grote.

As yet the only described species of the genus from America with yellow hind wings. Specimens sent to Prof. Zeller for examination were kindly determined by him as allied to the Siberian *A. chardinyi.*

Agrotis conflua, (Tr.)

I am indebted to the kindness of Mr. Geo. Norman for some fragments of Scotch specimens of this species, and although my comparisons are not as absolute as I could wish, I feel little doubt that the twenty-four specimens collected by Mr. Couper belong to this species, which is apparently not well known on the Continent. Two Swiss specimens in the collection of the Buffalo Society offer but unimportant differences, while the species seems to vary in the intensity of the color and distinctness of the markings. I have described this species and the preceding in the Report of the Peabody Academy, and I am under obligation to Mr. Geo. Norman for his assistance in this very interesting determination. According to Dr. Staudinger, the species occurs in Iceland, where it is subject to great variation in color.

Eurois occulta, Hubner.

The American specimens are generally more blackish than those from the Continent of Europe, but seem to agree with the form taken in Scotland and the north of England. Mr. Lintner's Albany specimen was more purplish and stouter, and like German specimens in the collection before me.

Hyppa xylinoides, Guenee.

One specimen.

Nephelodes violans, Guenee.

One specimen.

Heliophila commoides, (Guenee).

The three specimens are less reddish on the primaries than my material from the Middle States, with the dotted t. p. very distinct, but do not seem to differ specifically.

Pyrophila pyramidoides, (Guenee).

One specimen.

Plusia 8-signata, Sanborn.

One specimen.

Plusia simplex, Guenee.

Several specimens.

Plusia bimaculata, Stephens.

This is Guenee's *P. u-brevis;* Mr. Couper's material is in fine condition.

Plusia mappa, G. & R.

One specimen.

Cucullia intermedia, Speyer?

One specimen, much rubbed.

Tarache erastrioides, (Guenee).

Drasteria erichto, Guenee.

Two specimens.

MICRO-LEPIDOPTERA.

BY V. T. CHAMBERS, COVINGTON, KENTUCKY.

Continued from Page 52, vol. vi.

CHYSOPELEIA, *gen. nov.*

This genus, though closely allied to *Stilbosis*, *Walshia*, *Elachista*, &c., differs from them somewhat as to the palpi, and yet more as to the neuration of the wings. In the neuration it is near *Stilbosis*, but in many respects is nearer *Walshia*.

Anterior wings lanceolate, caudate. The costa attains the margin about the middle; discal cell long, narrow, and closed by a slightly oblique discal vein; the costal vein is furcate just before the apex, delivering one of the branches above and one below it; it also sends another branch to the costal margin from behind the cell, one at the end of the cell, and two before it; the discal vein sends a vein to the hinder margin from a point near the median, which passes straight to the hind margin, and just before the discal vein sends a branch to the hind margin also; the submedian is furcate at the base.

Posterior wings linear lanceolate. Costal vein obsolete; the subcostal proceeds straight to the apex, sending a single branch to the *hind* margin just before the apex; the median is slightly sigmoid, attaining the hind margin at about the apical one-fourth, and delivering to it three other branches, the first about the middle. Submedian short.

Wings convoluted in repose, with tufts of raised scales on the anterior ones, *and the tips bent under*. Head and face smooth, with appressed scales; vertex broader than long; face much receding and very narrow; eyes small; antennæ sub-pectinate, a little more than half as long as the wings; palpi drooping, of moderate size; no visible maxillary palpi; tongue rather short, scaled; terminal joint of labial palpi acute, and about two-thirds as long as the second, which is a little enlarged at its apex.

It is not a typical *Laruna*, and yet, possibly, ought not to be separated from it. But I place *Stilbosis*, Clem., as my precedent,

C. purpuriella. N. sp.

Very dark purplish blue, almost black, with an indistinct confused oblique yellowish fascia about the apical fourth. The tufts are black or very dark brown; one is placed within the dorsal margin, at about the basal one-fourth, opposite the space between two others placed opposite to each other, about the middle, and a fourth at about the apical fourth of the wing, also opposite the space between the second and third. The tufts are arranged thus: - ¦ - *Alar ex.*, ¼ inch. Kentucky. Larva unknown.

AEAEA, *gen. nov.*

Allied to *Chrysopelia*, *Stilbosis*, &c.

Primaries lanceolate, tufted; discal cell narrow and rather acutely closed; the costal vein is short and close to the margin; the subcostal gives off three branches beyond the middle, and a fourth one from the

end of the cell, and has a common origin with the apical branch, which is bifid close to the apex. The median divides into three branches from the apical part of the cell (the submedian is furcate at the base ?)

Secondaries very narrowly lanceolate. The costal attains the margin about the basal fourth, and from thence to the tip the margin is excised; the subcostal is almost obsolete towards the base and passes straight to the tip; discal cell unclosed; the median divides into three ? branches (or into two ? with an independent discal branch arising so close to them that I have not been able to determine certainly whether it is connected with them or not).

Head smooth with appressed scales; vertex wider than long; antennæ simple, scarcely more than half so long as the wings, with a somewhat elongate basal joint. No visible maxillary palpi; labial palpi long and slender, over-arching the vertex; terminal joint about two-thirds as long as the second. Tongue moderate, densely scaled towards the base.

A. ostryæella. N. sp.

Face, palpi, legs and under surface of the body pale or hoary gray with a faint bluish tinge. Vertex, antennae, thorax and primaries dark steel gray, with a blue or purplish tinge. The basal portion of the dorsal margin of the primaries pale gray, with many of the scales tipped with hoary; behind this lighter portion of the dorsal margin is a rather large raised tuft of blackish or bluish brown scales. An oblique pale gray or whitish fascia crosses about the middle of the wing, being widest and farthest from the base on the dorsal margin, and being margined behind by two small dark tufts of raised scales. About the apical third of the wing is a second fascia of the same hue with the first, and parallel to it, with a small dark tuft of raised scales on its anterior margin and two others on its posterior margin, and in the apical part of the wing, on the dorsal and costal margins and at the apex, three or four other minute tufts of the same hue. The apical part of the wing and ciliae are sprinkled with hoary or snow-white, many of the scales being tipped with that color. *Al. ex.* scarcely ¼ inch. Kentucky.

The larva mines the leaves of the Ironwood *(Ostrya virginica).* I have occasionally, though very rarely, found a single specimen of the mine in June and July, but in August, September and October nearly every leaf upon the trees will have its mine, and many leaves will contain several. The larva is yellowish white, with the mouth ferruginous, and

two small brownish spots on top of each of the next three segments after the head, and is nearly cylindrical. It is exceedingly difficult to rear the imago, mainly, I think, because the *Ostrya* leaves dry up so quickly, and the larva will seldom make a new mine after leaving an old one, though I have sometimes known it to do so. It leaves the mine to pupate in a small whitish ovoid cocoon among the leaves on the ground. The mine is a singular one. In the natural way it begins at the junction of a vein and the midrib, and extends along the midrib to the next vein ; there the parenchyma is taken out between the two veins and with the frass a little tube is constructed along the midrib, and from the mouth of the tube to the edge of the leaf two walls of frass are constructed, between which the larva, when disturbed, retreats into its tube. In the breeding cage, when the leaves are bent or the larva is crowded, it will sometimes vary the form of its mine, or even form a new one, but I doubt if in a state of nature it ever passes beyond the midrib or the two veins. From probably three hundred mines which I have gathered, I have not succeeded in raising half a dozen insects, and Dr. Clemens does not seem to have met with better success, for he does not seem to have been acquainted with the imago, though he mentions the mine and larva in his letter to Mr. Stainton of Oct. 10th, 1859, which is published with an excellent figure of the mined leaf in Mr. Stainton's edition of the Clemens Papers, page 27.

THEISOA, *gen. nov.*

Maxillary palpi microscopic ; labial palpi ascending above the vertex (a little longer than in *Elachista*). Antennae simple, more than half as long as the wings. Head and face smooth.

Primaries lanceolate ovate ; the costal attains the margin just before the middle. Discal cell very narrow, and closed by a very short discal nervule ; the subcostal sends a branch to the margin from before the middle, another from near the end of the cell, and then is deflexed to meet the discal vein, beyond which it sends another branch to the costal margin and there becomes furcate before the tip, delivering a short branch to each margin near the tip. The discal vein is short, straight, a little oblique, and without branches. The median vein gives off to the dorsal margin a single branch beyond the middle, and becomes furcate just beyond the end of the cell. The submedian is furcate at the base.

Posterior wings linear lanceolate. The costa slightly excised from the middle to the tip ; the costal vein is near the margin, which it attains at

the excision; the subcostal passes nearly straight to the apex, its basal half being obsolete; it gives off no branches. Cell unclosed; the median sends a branch to the dorsal margin about the basal fourth, and becomes furcate about the apical third. Wings horizontal in repose.

Ciliae of both wings moderately long. The neuration of the primaries is very nearly the same with that of the next described genus, *Philonome*, but is still nearer to *Elachista*, from which, however, this species differs in having the wings horizontal in repose, and the antennae longer and more pointed.

T. bifasciella. N. sp.

Palpi silvery white; face white, tinged with golden yellow, which deepens towards the vertex, where it becomes pale ochreous; antennae with alternate annulations of white and dark brown; thorax and basal third of the primaries pale saffron, slightly suffused with fuscous; at the basal third of the primaries is a silvery white fascia dark margined internally, and thence to the tip the wing is pale saffron yellow, suffused with fuscous and white and becoming darker towards the apex; at the apical third is a second white fascia, which is frequently very indistinct or even obsolete, except upon the costa, where it is oblique, distinct and strongly dark margined internally, or rather with a dusky spot on the costa before it. Ciliae dusky yellowish. *Al. ex.* nearly ⅓ inch. Kentucky in May. Larva unknown.

ELACHISTA.

E. praematurella? Clem.

This species belongs to the sub-group containing *E. nigrella* of Europe. Possibly it may prove to be one of the European species. I am not absolutely certain that my captured specimens belong to *praematurella*, as I have not seen any of Dr. Clemens' specimens, and do not, indeed, know that there are any extant. I do not know its food plant, though from the frequency with which I have found its corpse-like pupa on fallen leaves in "blue grass" pastures, I suspect that it mines that species *(Poa pratensis)*, and this suspicion is strengthened by the fact that other species of the same group mine plants of the same genus in Europe. Dr. Clemens was not acquainted with the food plant of *praematurella*. In my specimens the costal and dorsal spots are opposite as Dr. Clemens describes *praematurella*, but the fascia is a little oblique,

being a little nearer to the base on the costal than on the dorsal margin, and the wing before the fascia has a grayish hue, occasioned by minute white dusting, and Dr. Clemens does not mention these particulars in *praematurella;* but a more decided difference is that in *praematurella* the fascia is "just behind the middle," whilst in this species it is just before it. My specimens are near *E. gregsoni*, as figured by Mr. Stainton, but have less white at the apex. But the species of this group are very difficult to distinguish without comparison of bred specimens, and I have not thought it necessary to separate my specimens from *praematurella*. It is the only true *Elachista* that I have thus far met with here, though some of the immediately preceding genera approach this genus closely. Like *praematurella*, my specimens appear early in April.

BOOKS RECEIVED.

The first number of "The Cincinnatti Quarterly Journal of Science," published in January, came to hand in due season. It is a well got up octavo serial of 96 pages; editor and proprietor, S. A. Miller, Cincinnatti, Ohio; price, three dollars per year. Among the more interesting original papers contained in this number we notice one by our esteemed friend and contributor, V. T. Chambers, of Covington, Ky., on Fresh Water Entomostraca, and among the selected articles, "Facts in the Physiology of Spiders and Insects," and "Movements of Insects on Dry, Polished and Vertical Surfaces," both by John Blackwell, from the Jour. and Pro. of the Linnean Society. In addition to these there are a number of interesting original and selected papers on Geology, Botany, Zoology, &c. We sincerely wish this new journal success.

Illustrations of the Zygænidæ and Bombycidæ of North America, by Richard H. Stretch, San Francisco, vol. 1, parts 8 and 9. These two parts issued together complete the first volume of Mr. Stretch's excellent work on the Zygænidæ and Bombycidæ. These latter parts contain three colored plates, two of moths, illustrating 29 species, and one of larvae, containing 11 species. The whole volume consists of 242 pages octavo of letter-press, with ten well finished colored plates, on each of which a number of species are faithfully delineated. In this work—in addition to

the author's own material—are brought together a large number of facts and details hitherto scattered throughout the various scientific journals and publications, relating to the members of this interesting family. We hope Mr. Stretch will receive such encouragement from Entomologists as will reward him for his valued labors in this department, and stimulate him to further efforts.

Catalogue of the Phalaenidæ of California, No. 2, by A. S. Packard, jr., M. D. This is an octavo pamphlet of 40 pages, with one photograph plate, illustrating 24 new species, detailed descriptions of which are given in the accompanying letter-press, together with many other interesting facts relating to other Californian species.

EDITORIAL SUMMARY.

MR. RILEY RECEIVES A HANDSOME TESTIMONIAL.

The following correspondence explains itself:

AGENCE CONSULAIRE DE FRANCE A ST. LOUIS,
ST. LOUIS, MO., FEB. 23, 1874.

Prof. Chas. V. Riley, State Entomologist, St. Louis, Mo.:

DEAR SIR.—I have the honor to inform you that his excellency, the Minister of Foreign Affairs, has forwarded to me through the Consulate of New Orleans, the gold medal awarded to you by the Minister of Agriculture and Commerce, of France, in appreciation of discoveries in economic entomology, and especially of services rendered to French grape culture.

I congratulate you sincerely on this well deserved compliment. It is a proof that your talents and labors have been recognized by very high and competent judges.

Accept my assurance of the high regard with which I am, yours respectfully,

EMILE KARST,
Agent Consulaire de France.

The medal is of gold, very heavy and handsomely finished. It is round, probably an inch and a half in diameter, and bears upon its face the head of the Goddess of Liberty, in bas-relief, with the words: "Republique Francaise." Upon the reverse is:

"Mr. Riley, a St. Louis, Missouri, Services Rendus a La Viticulture Francaise, 1873," encircled by "Ministere de l'Agriculture et du Commerce."

The following is Mr. Riley's acknowledgement:

ST. LOUIS, FEB. 23, 1874.

Emile Karst, Agent Consulaire de France:

MY DEAR SIR.—Your favor of to-day is at hand. Knowledge, to the seeker after it, brings with it a reward far higher and more lasting than any outward token. Yet am I gratified to receive this testimonial of appreciation from the French Republic; because it shows that, while endeavoring, as a servant of the State of Missouri, to do what lies in my power for the advancement of agriculture within her borders, my efforts have been appreciated elsewhere. It illustrates that science—the true interpretation of nature's workings, and mighty lever to civilization and progress—is not local, but sheds her bright beams among all nations. It proves that the discovery of any fact tending to promote the comforts and conveniences of human existence, or, as Bacon so tersely expresses it, *humanis commodis inservire*, belongs not to one State alone, but to the world. Yours respectfully,

C. V. RILEY, State Entomologist.

THE PHYLLOXERA.

The following article from the Bulletin des Sceances de la Society d'Agriculture de France, 1872, p. 514, may be of interest to some of our vine-growers as showing the good effect of an application of soot for the destruction of the grape-vine root gall-louse. However, not having tried the soot ourselves, we can only give the experience of others, and add that Dr. Erni, formerly chemist to the Department of Agriculture, in a letter from Berne, Switzerland, has also highly recommended the use of soot for the same insect.

"M. Rogier, mayor of Poule Gard, exhibited to the central society of agriculture the results obtained by the use of soot in the treatment of vines attacked by the *phylloxera*. A young vine attacked by this insect in 1869, was treated with soot put at the foot or root of each stem, in the quantity of a half kilogram, (about one and one-tenth of a pound.) The vine recovered. The following years all the stems which composed it were smoked with soot. This vine has a remarkable vigor, while the neighboring vines were dead or seriously injured. All vines treated with

soot, used as a preservative compost, are healthier, although surrounded with diseased vines."

We give the above extract for what it is worth, and hope some of our correspondents will try soot and report the result to the Department, as we have scarcely any of these destructive insects in our own immediate neighborhood. In reference to this insect, the grape-root gall-louse, the Department has received a very interesting letter from Mr. George W. Campbell, of Delaware, Ohio, in which he expresses his opinion that the aphis *(pemphigus)* affecting the leaves and that upon the roots are not identical. He says:

"I have since then found in two instances what were doubtless eggs of the *phylloxera* (root-gall-louse) upon diseased roots the same as those within the galls, but solitary, and not in clusters as in the galls. This, I think, settles the question that the aphides infesting the roots are propagated under ground, upon the roots, and that they are probably not the same as are propagated in the galls upon the leaves."

Mr. Campbell also sent specimens of the roots injured, together with numerous root gall-lice clustered upon them, but although carefully examined with the microscope, we failed to find any eggs whatever upon the roots sent. These roots, however, have been planted just as received, with the insects upon them, in a flower-pot, and placed in a large wardian case in close contact with other pots containing healthy vines, in order to find out if the insects will pass from one vine to another during the winter, and if the healthy roots will next season be infested with either root or leaf gall-lice. We give Mr. Campbell's remarks merely to stimulate further inquiry into the identity of the two insects, as many naturalists have stated them to be merely varieties of the same insect. In France, it appears that flooding the vineyards at certain seasons to drown the insect out has been recommended, but this plan, even if successful, could only be carried out in level places, and could not be adopted in side-hill vineyards.—*Monthly Report of the Department of Agriculture.*

Correction.—We would draw attention to an error which appeared in Dr. Summers' advertisement last month, and which will be found corrected in the present issue. It is in reference to the time up to which shares may be secured of the material to be collected in the lengthened tour he is about to undertake. It should be up to *December*, 1874, instead of April; after that date specimens only will be for sale; we have a few yet to dispose of,—parties desiring them will please address our Secretary.

The Canadian Entomologist.

VOL. VI. LONDON, ONT., MAY, 1874. No. 5

ON SOME OF OUR COMMON INSECTS.

15.—THE COCCINELLIDÆ.

BY R. V. ROGERS, KINGSTON.

"Of all the painted populace that live in fields and live ambrosial lives," there is scarcely a family better known than those which compose the last of all the tribes of Hard-shells, the Coccinellidæ. To the young and to the old, to the illiterate and to the scientist, they are equally familiar and equally interesting. Popular sympathy is extended towards them by the elders because they do much good in preventing the excessive multiplication of Aphides; by the juveniles because they are very pretty little things and tamely pitter-patter to and fro, and their supposed misfortunes affect deeply sensitive little hearts, while infantile accents lisp "Lady-bird, lady-bird, fly away home; your house is on fire, your children are burned." They are distinguishable chiefly by the colors of and the spots upon their wing covers; the different species are sometimes difficult to discriminate; they number upwards of one thousand, and more than thirty species are known to inhabit Canada.

The general colors of the Coccinellidæ are yellow, red or orange, with black spots, and black with red, white or yellow spots, the spots being either lunate or round. Their shape is hemispherical, and although of variable size, an average specimen "bears a considerable resemblance in size and figure to an ordinary split pea; they have but very short legs and therefore creep but slowly; their powers of flight, however, are considerable." When alarmed or laid hold of, they fold up their tiny limbs and eject from the joints a yellow, mucilaginous fluid, which has a somewhat strong and disagreeable odor. This fluid entitles the pretty Lady-birds to be ranked among the *materia medica*, and to be assigned a place in the Phamacopœia, for it is a superior, cheap and never-failing

remedy of that most harrowing of pains, the tooth-ache. The learned President of the Entomological Society of Ontario says that he has never possessed sufficient courage to test its qualities himself, but a well-known American brother of the net and bottle tells us that he tried this application in two instances, and the tooth-ache was immediately relieved; but he confesses that he was uncertain whether the remedy or the faith of the patient acted therapeutically, or the tooth ceased troubling of itself. Let us be charitable and give the benefit of the doubt to the pretty little beetle.

The Germans call these insects *Marien-kaefer*, Lady beetles of the Virgin Mary; while in France they have the equally fine names of *Vaches de Deice*, or *Betes de la Vierge*, Cows of the Lord or animals of the Virgin. And they have good claims to be held in such esteem, for they are most beneficial to man in destroying the plant-lice, which, if allowed to go on propagating and increasing unchecked, would soon reduce the most fertile country into a barren and a howling wilderness. Lady-birds both in their perfect and in their larval state, feed on these lice, and, providentially, few trees, plants or shrubs infested by these disgusting and destructive creatures are to be found whereon is not also this antidote for them. The grubs, which are of a flattened shape and darkish color, spotted usually with red or yellow, and furnished with six short legs near the fore part of the body, are far more voracious than the mature insect; they creep along on the leaves of plants until they find the helpless Aphides, among which they ravage and riot like wolves in a sheep-cot,and then, doubtless, many a heart-broken Aphis parent, pointing to the aldermanic proportions of the lady, exclaim: "Foul murder hath been done; lo! here's the proof!"

Occasionally Lady-birds occur in immense swarms. Kirby and Spence relate that on one occasion the banks of the Humber were so thickly strewn with the common species, that it was difficult to walk without treading upon them; at another time they covered in great numbers the sand-hills of Norfolk, and again, the cliffs of Kent and Sussex, "to the no small alarm of the superstitious, who thought them the forerunners of some direful evil."

The eggs of these little creatures are long and oval,of a yellowish color and deposited in patches, oftimes among a colony of plant-lice, so that, thanks to the wondrous instinct of the mother, the larvae have not far to crawl to get their first hearty meal.

The larvae consume immense quantities of Aphides, and may be seen chasing, or rather, stalking the plant-lice, and eating them one after the other, taking the whole set on a leaf or stem in regular order. "The larvæ (see fig. 9) are rather long, oval, soft-bodied and pointed behind, with the prothorax larger than the other rings, often gaily colored and beset with tubercles or spines." After having eaten voraciously for the appointed time, the larva attaches itself by its tail to a leaf or a twig—after the fashion of a caterpillar—and either throws back its skin or else keeps it loosely folded about it as a protection; in this position it remains quiescent for some ten or fifteen days, and then emerges a perfect insect.

Fig. 9.

We will now briefly refer to some of the well known Coccinellidae which make the Dominion of Canada their home.

The Two-spotted Coccinella, *C. bipunctata*, Linn., is our most common species. They appear to have two broods each season; the eggs are of an orange yellow, and attached in bunches of about twenty-five to the bark of trees. They hatch out when the leaves and their natural article of diet, the Aphis, appear. The body of the larva is black, with flattened tubercles, adorned on top with spines; on each side of the first abdominal segment is a yellowish spot, and there is another broad one in the middle of the fourth segment, and one on each side. Packard thus describes the *modus operandi* of the larva becoming a pupa, and the appearance of the pupa itself: "The larva begins the operation by attaching very firmly, with a sort of silky gum, its tail to the leaf, the point of attachment not being the extreme tip, but just before it, where the tip of the abdomen of the pupa is situated. Meanwhile the body contracts in length and widens, the head is bent upon the breast, and in about 24 hours the skin splits open and discloses the pupa. The body of the pupa is black; the head is also black, and the prothorax is black and yellowish pink, with a black dot on each side, and a smaller black dot on each edge. The meso-thorax, wing-covers, scutellum and legs are shining black. The abdominal rings are pale flesh-colored, with two rows of large black spots on each side, the spots being transverse; the terga of the fourth to the seventh segments are separated, the body being arched and leaving a deep furrow between."

Fig. 10.

The Nine-spotted Coccinella, *C. novem-notata*, Herbst. (see fig. 10), is one of our most common beetles, and may be found in all parts of our Dominion; it is of a red brick color, somewhat

larger than the Two-spotted, and ornamented with nine black spots.

The Plain Lady-bird, *C. munda*, Say. (see fig. 11), is rather smaller than the others of its kind, of a light brick red, but with its elytra unadorned with any spots.

Fig. 11.

The Three-banded Coccinella, *C. trifasciata*, Linn, is of a red brick color, marked with two irregular black bands across the elytra, and a black spot near the posterior angle. It is of an intermediate size between its cousins, the Two-spotted Lady-bird and the Fifteen-spotted Mysia.

The Spotted Lady-bird, *Hippodamia maculata*, De Geer (see fig. 12) is a small pinkish beetle, but occasionally of a pale red, with large black blotches twelve in number; two of them on one elytron are opposite to and touch two on the other. Mr. Riley says that this insect commits great havoc upon the Chinch Bug, and upon the eggs of the Colorado Potato Beetle.

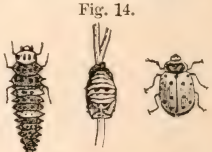
Fig. 12.

The Thirteen-dotted Lady-bird, *H. 13-punctata*, Linn. (see fig. 13) is rather larger than the preceding: it has thirteen black spots on a brick red ground.

Fig. 13.

The Convergent Lady-bird, *H. convergens*, Guer. (see fig. 14) is of a deep orange red color, marked with black and white. It has been of great use in checking the ravages of that destructive pest, the Colorado Bug; its larva is blue, orange and black, and in its pupa state it is of the exact color of the larvae of the Colorado Beetle, for which it is often, doubtless, mistaken and ruthlessly destroyed.

Fig. 14.



A B C

The Parenthetical Lady-bird, *H. parenthesis*, Say, is a small beetle of a dull red color, and can be easily distinguished at a glance by the dark marks, curved like the bands of a parenthesis ( ), one on the hinder part of either wing cover; there are two black spots on each elytra, besides the parenthesis, one on the anterior part and the other on the inner margin, touching the one on the other cover.

The Fifteen-spotted Mysia, *Mysia 15-punctata*, Oliv., is black on the head and prothorax, with seven black spots on each of the brownish red elytra, and another on the scutellum, according to Packard. But it appears to vary much in its perfect form and in color from a very light

grey to a deep chestnut brown. The larva, which is about half an inch in length, black on the upper surface, with a pale spot on the under edge of the prothoracic ring, and furnished with six rows of stout spinulated spines, is an inveterate foe to the larvae of the Colorado Beetle, and on page 169 of the third volume of the ENTOMOLOGIST we have a most graphic account of the summary way in which the young lady despatches the grub.

The *Chilocorus bivulnerus*, Mulsant (see fig. 15) is an obese little thing, with minute legs, of a black color, and beautified with two yellow spots.

Fig. 15.

Such are a few of the very many Lady-birds that creep among our trees and adorn our Entomological cabinets.

REMARKABLE VARIATIONS IN COLORATION, ORNAMENTATION, &c., OF CERTAIN CREPUSCULAR AND NOCTURNAL LEPIDOPTEROUS LARVÆ.

BY THOMAS G. GENTRY, GERMANTOWN, PA.

Having spent considerable time during the past season in the collection and study of various larval forms of our twilight and night-fliers, I was peculiarly impressed with the novel colors, markings, and external structural characters presented by those that were taken late in the autumn, at the period when the leaves were donning their autumnal hues. To one who has rendered himself familiar with their usual outward characters, a moment's inspection was sufficient to show a marked contrast between those taken early in the season, when the leaves were fresh and green, and those captured later, when the foliage of the trees had sustained a check to their vitality. That these larval changes have a producing cause it shall be my aim to show in the conclusion of the present article.

Of the many specimens taken by the writer during the past season, and they were confined to but a few species of as many genera, none exhibited these variations more clearly and prominently than *Telea poly-*

phemus (Attacus polyphemus of Fabricius), *Actias luna*, Linn. *(Attacus luna* of Fabricius), *Eacles imperialis* of Hubner, and the *Sphinx quinquemaculata* of authors. Before entering into a description of the anomalous forms, the writer deems it not amiss to detail the leading characters of the normal ones after their last skin moulting, and just prior to their assumption of the chrysalis condition.

Actias luna, Linn.

Attacus luna, Fabr. (normal.)

Des.—Length of caterpillar, three inches. General color, pale bluish green. Head nearly elliptical, somewhat pearl colored. Oral appendages similarly colored. A pale yellow stripe extending along each side, just below the line of spiracles, from the first to the tenth segment; narrow transverse bands of a similar color between the rings, continued from side to side, crossing the dorsum. On each ring there are six pearl-colored warts, tinged with purple, and at the posterior part of the abdomen three brown spots, edged above with yellow. Specimens captured in August whilst feeding upon the Black Walnut *(Juglans nigra.)*

Variety of same.

Des.—Length, two and three-eighth inches. General color, reddish brown inclining to dullness. Head and oral appendages similar. The lateral and transverse stripes wanting, passing, no doubt, through the various shades of yellow, orange, red, into the general color of the body. Posterior brown abdominal spots present, but lacking the yellow edging and shining very conspicuously from the depth of their color. The six pearl-colored warts, with their purple tinge, have assumed a richer hue, blazing like a coronet of rubies. Taken in October, early part, while feeding upon *Juglans nigra.* Cocoons of a beautiful reddish brown. Number of specimens taken, six.

Telea polyphemus (normal).

Des.—Length, three inches. General color, golden green. Head light brown, nearly elliptical; mouth pieces similarly colored. A transverse, conspicuously-colored yellow band on the posterior margin of the pro-thoracic segment. Six rows of gold-colored warts, two dorsal, two lateral, and two sub-lateral, reaching from the meso-thoracic to the eighth abdominal ring; each wart tipped with two moderately long blackish hairs. Between the rings, from the fourth to the tenth segment, a trans-

verse yellow band. Spiracles transversely oval, with brown centres, encircled with yellow. Taken during the latter part of August, while feeding upon *Acer rubrum*.

Variety of same.

Des.—Length 2¾ inches. General color green, with a stronger and richer tinge of yellow. Head and oral appendages a deeper shade of brown than the preceding. The warts of the color of red sealing wax along the back, but upon the lateral walls somewhat elongate oval in shape, of an orange color in the middle, deep red above and below, and with a narrow vein of the latter color encircling the whole. Spiracles transversely oval, red in the centre, and surrounded by an orange-colored border. Taken during the second week of October while feeding upon the leaves of *Acer rubrum*. Number of specimens captured, twelve. These caterpillars have a very close resemblance in markings to the normal form of the larva of *A. luna*.

Eacles imperialis, Hubner (normal).

Des.—Length, four inches. General color, varying from a dark to a light green. Head nearly elliptical, dark brown. Oral appendages similar in color. Six rows of spiniferous tubercles, two dorsal, two lateral, and two sub-lateral, extending from the first to the last segment. The meso and meta-thoracic spines moderately long and slightly curved; spiracles oval, with dark centres and yellowish margins. The entire larva invested with a dense growth of long gray hairs. Taken during the last week of August, and the early part of September. This species has been observed to feed upon *Juniperus Virginianus*, *J. communis*, *Acer rubrum* and the various species of *Pinus*. I might add here that for the past four years, in the neighborhood of Germantown, it seems to have deserted in a great measure Coniferous plants, and to have taken to *Acer rubrum*. Where I find one upon cone-bearing plants, I discover twenty upon the Red Maple.

Several varieties of the *imperialis* of Drury have been observed as late as the 12th of October, exhibiting marked contrasts from the normal form, and varying slightly from each other in the details of color and marking.

Variety A.

Des.—Length, two and three-fourth inches. General color, reddish brown. Head and oral appendages similarly colored. Spines small in

proportion to size. Entire body slightly invested with short scattered hairs. Two specimens only taken, while feeding upon *Acer rubrum.*

Variety B.

Des.—Length, two and a half inches. General color dark brown, exhibiting in certain parts a decided shade of black. In other particulars identical with Variety A. Found at the base of a pine tree. Most likely had been dislodged therefrom. It had evidently not attained its full size, since it continued to feed for nearly a week afterwards. No apparent change was observed in its color from the above, at the time of entering the ground.

Variety C.

Des.—Length, nearly three inches. General color light yellowish brown, with a dark median dorsal band an eighth of an inch long, extending from the posterior margin of the pro-thoracic to the beginning of the anal segments; a much wider one above the line of spiracles, and a similar one above that of the pro-legs. These longitudinal bands were crossed between the rings by transverse ones, similar in color. Spiracles with dark centres and yellowish rims. Entire larva presented a perfectly smooth surface, affording a striking contrast to that of the normal type. Taken upon *Acer rubrum.* Six specimens captured.

Sphinx 5-maculata (normal).

Des.—Length, three inches. General color, green. Head and oral appendages dark, inclining to black. Lateral, oblique, beaded bands of a light color, seven in number, each band passing obliquely through two segments, from the first abdominal to the anal inclusive. Spiracles nearly circular, with dark centres, surrounded by light annuli. Caudal appendage nearly black, somewhat armed with rudimentary spines. Taken in the early part of September, while feeding upon the different varieties of our ordinary white potato, *Solanum tuberosum*, L., the common Jamestown Weed, *Datura stramonium*, L., and the cultivated tobacco, *Nicotiana tabacum*, L.

Variety of same.

Des.—Length, varying from two and a half to two and three-fourth inches. General color dark, bordering on black, rivalling that of the head of the normal form. Lateral oblique bands similarly colored with

the body, their outline being indicated by the prominence due to their beaded structure. Spiracles dark, with no trace of light annuli. Observed during the middle of October, in the vicinity of Bristol, Penn., feeding upon the frost-bitten leaves of *Nicotiana tabacum*.

CONCLUSIONS.

That the abnormal forms described above should present such curious deviations from the ordinary normal type, is to me a rather interesting occurrence. That they are to be considered as the effects of a legitimate cause is a settled conviction in my mind. What the cause is it will be my aim to show. Happening at a period when the leaves of plants show a diminished state of vitality, and are assuming the characteristic hues of the season in consequence of the introduction of chemical changes into their parenchymatous material, it seems that the variations are in some way connected with *defective nutrition*. The unusually small sizes of the larvae, when compared with the normal forms, add great weight to such an opinion.

It will be seen that the colors of the caterpillars rival those of the changing leaves. In few cases all the transitional color stages from the natural one of the larva to that which is last assumed, were distinctly observed by the writer, thus clearly proving the two facts to be connected with each other in the relation of effect and cause.

If the beautiful and varied shades of green which many caterpillars present can be attributed to the green and granular chlorophyl of the leaves upon which they subsist, the conclusion must be irresistible that when chemical or other changes are inaugurated in the parenchyma of the leaf, thereby inducing color changes, the introduction of such food into the insect's economy must give rise to changes therein which will have a tendency to vary its external coloration and markings.

'Tis true that the variable colors of animals in many cases are brought about through the influence of the *will*. The changeableness of our ordinary *Hyla versicolor*, Lec., might be cited as an example, and the number of such might be prolonged to considerable length, but the cases are so numerous and so well known that it would not be advisable to give them notice in a paper like the present. In the above example the color variableness serves to conceal the animal from its enemies by adapting it to the colors of objects upon which it chances to place itself.

I do not know of any recorded instance where the larvae of the countless numbers of our Lepidoptera possess a similar faculty. Indeed, had such a case been observed, especially in a single individual of any of the above genera, I should assuredly have characterized it as one where the animal possessed the power of altering its color, in accordance with the dictates of a "will principle," whereby its protection was secured. This power of adaptation to the colors of the insects' natural food, being protective in its character, would be preserved, and thus, in the course of time, all the individuals of the species would adopt it.

But I am satisfied that the will (for assuredly these humble forms of animal life are endowed with a small degree of it) has nothing to do with these color transformations, but aver that they are due to the effects of a changed nutrition, as specimens, as above asserted, were observed exhibiting the transitional stages.

It has been shown by a French experimenter, according to the *Chronique de la Society d'Acclimatation*, that by feeding silk-worms on the leaves of the vine, cocoons of a beautiful red have been obtained, and by the employment of lettuce, others of a rich emerald green. By another Frenchman, silk of a beautiful yellow, of a fine green, and of a violet have been obtained by feeding the silk-worms on lettuce or on white nettle. An essential condition to the success of the experiment is to feed the worms on the mulberry leaves during their early ages, and to change the food twenty days prior to the introduction of the chrysalis state.

There can be no doubt that the silk-bearing glands of the caterpillars undergo a certain degree of modification, consequent upon the introduction of foreign material into the insect's economy, whereby they adapt themselves to the absorption of the proper elements from the general circulation, necessary to give to the silk its characteristic colors. It is clear that the color of the silk depends upon the food of the larva. Such being a true statement of the facts of the case, why will not a changed condition of the same food, evolved in obedience to the action of chemical or physical forces in the parenchymatous matter of the leaves, have a similar tendency? If the different capacities of different leaves to produce diverse effects are due to the chemical activities at work therein, bearing in mind that the same simple elements enter into the composition of all leaves, why will not leaves undergoing chemical and physical changes have different effects upon the tender beings that appropriate them as food, as well as the same food in a stable condition?

In caterpillars that exhibit different shades of green, their external appearances are due to the characteristic colors of thelr blood. If this blood undergoes changes, the muscles, tissues and other parts, which are the out-growths thereof, must evidently adapt their constitution and color thereto.

To my mind this theory seems perfectly plausible. Whatever cause may be assigned to account for the phenomena, there is no getting over the fact that the two are synchronous events.

A DISSERTATION ON NORTHERN BUTTERFLIES.

(Continued from Page 59).

BY WILLIAM COUPER, MONTREAL.

The meeting with *Papilio turnus* on the Island of Anticosti, astonished me, as I did not expect to find this butterfly so far north in the Gulf of St. Lawrence. Only two specimens were taken during the season, and old settlers say that it is always rare. Anticosti is evidently its most northerly limit, as it does not occur on the opposite shore of Labrador. It is common at Halifax, N. S., and in many localities along the south side of the St. Lawrence, until we reach the lake and rocky regions on the heighth of land from which the Assomption river flows north of Montreal. Plants of the family *Oleaceæ* are generally selected by *turnus* as food of the larvae. They feed on *Fraxinus trifoliata* and probably the Swamp Ash of the south. The Anticosti food plant of *turnus* is not known to me; it may be a species of *Fraxinus;* whichever it is, the Island of Anticosti, which stands between latitudes 49° and 50°, is evidently the most northern range of that class of plants tending to the existence of this butterfly.*

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* NOTE.—Mr. Scudder gives the following food plants of *P. turnus:* Apple, wild-thorn, choke cherry, cultivated cherry, alder, tulip, bass-wood, oak, black ash and birch. The former eight do not grow on Anticosti, but the latter two may Mr. Saunders found them feeding on cherry—"CAN. ENT., vol, i, p. 74."

The Island specimens are smaller, and the dark portions of their bodies blacker than those of the west and south. Although undoubtedly *turnus*, they exhibits sufficient change of color to claim attention. Possibly the larval food is the power whereby this variety is produced. I have not had an opportunity of comparing specimens of *turnus* from widely separated localities, but it is a fact that those occurring in the latitude of Anticosti are different from the *turnus* of the south and more temperate latitudes of America.

The dark color observable in the Anticosti *turnus* supports my view that boreal insects, especially the Diurnals of high latitudes, are blacker where the dark scales occur than their congeners of the south. The fact that *Papilio glaucus* var. *turnus* * feeds on the Hickory, while *turnus* has not been found feeding on the leaves of this tree, is, in part, evidence that although the variety is thus attracted by change of appetite to an unusual plant, the true form *(turnus)* holds to those food plants which have been recorded by the early writers on Entomology.

I took a few specimens of *Colias* on Anticosti last July, which Mr. Strecker informs me are *philodice*. † This is another rare butterfly on the Island, where its habits differ from those found at Quebec. The Anticosti *philodice* is a difficult insect to capture; its flight is rapid and continuous during the occasional hours of its appearance, and it is only towards the end of July, when the weather becomes cold, that it can be easily approached. ‡ When it alights on a flower, instead of being erect on its feet, it lies sideways, as if to receive the warmth of the sun. Here, then, we have the most northern *habitat* of *Colias philodice* almost on the dividing line between the Canadian and Arctic Insect Fauna.

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* NOTE.—See CAN. ENT., vol, v, p. 9.

† NOTE.—To my subscribers I distributed an equal share of what I supposed were two species of *Colias*, taken last year on Anticosti, and one of each was sent to Mr. Grote, who did not include them in his article on the butterflies of that island.

‡ NOTE.—Its habits are similar to *Colias edusa* of Europe, which has a lively flight. Mr. Coleman says that "his pursuer has need of the seven league boots, "with the hand of Mercury, to insure success in the fair open race, if that can be "called a race at all, between a heavy biped struggling and perspiring about a "slippery hill-side, such as *edusa* loves, and a winged spirit of air, to whom up-hill "and down-hill seems all one."

I believe that the most expert Entomologist would pronounce the Anticosti *philodice* different in habit from those found in the vicinity of Canadian cities. There appears to be a difference of opinion among Entomologists in reference to the variations in this insect. Mr. Edwards, of West Virginia, says: "I suspect that at least two species are passing "under the name of *Colias philodice*. The species is known to vary "widely, but some of the supposed varieties are extreme—almost too "much to be considered varieties, unless proved to be so by actual "breeding from the egg."

The only correct method by which to arrive at a conclusion as to the species constituting the genus *Colias*, would be the tracing of the imago (true form or variety) to the plants on which it deposits its eggs. It is possible that eggs deposited by a single female on two distinct American plants may produce larvæ showing variation from each other and from the ordinary coloration of larvæ of the original type, which may have been described in another latitude, and taken on a third food plant. These variations are known to occur, and a wide difference is seen between many species which systematists term representative Ameriean forms of European types. There is no question that great deviation exists between the species which are found on the two Continents, and the cause of such variation is what is now wished to be arrived at. We find certain butterflies localized or kept within a certain range, because climate restricts the growth of the bulk of that class of plants on which they feed. In such a case, one hundred examples of the butterfly will probably show no more variation than is general between the sexes, and I give *Pieris (Ganoris) borealis* as an illustration of this fact. Larvæ of the greater portion of North American Diurnals are said to feed on from two to ten distinct plants, and I am of opinion that it will yet be proved, when proper attention is given to Entomology in connection with Chemical Botany, that many of the perplexing varieties occurring among the true forms are produced by the food * which sustain the larvae.

* NOTE.—W. S. Coleman, in his remarks on the brilliant metallic spots which adorn the chrysalides of butterflies, says: "This golden effect is produced by a "brilliant white membrane underlying the transparent yellow outer skin of the "chrysalis *(Cynthia cardui)*, and it may be imitated, as discovered by Lister many "years ago, by putting a small piece of black gall in a strong decoction of nettles; "this produces a scum which, when left on cap-paper, will exquisitely gild it, without "the application of the real metal."

Late experiments made by a French Entomologist on caterpillars of a Bombyx,

The species comprising the genus *Grapta* of this country, are subject to very perplexing variations. Mr. Edwards, in vol. v, p. 148, CAN. ENT,, writes that Mr. Mead of New York, by experiment, identified *Grapta dryas* with *comma*. Two females of *Grapta dryas* were tied in a muslin bag, which was attached to a branch of Hop-vine, on the 3rd of July. "The result was a large number of eggs laid on the leaves and in the "bag." Tne eggs were all hatched on the 5th, and the first ones began to change on the 21st (he does not state the month, but as the imagines appeared on the 30th, I suppose the time to be August). "Towards "maturity some of the larvæ were white; the others were black, like the "larvae represented in Mr. Edward's plate of *comma*."

Here, then, is one experiment with "upwards of sixty" larvae, of what is said to be the product of *dryas*, resulting in giving imagines of true *comma*. As Mr. E. does not state how many white adult larvae were seen, it appears to me that this experiment, although a good one, does not prove the leaves of the hop to be free from eggs of another variety, and it may be possible that a female of *comma* visited that vine prior to the bag being placed over the branch. We have no direct evidence that all were the product of *dryas*.

Messrs. Edwards, Saunders, Scudder and Mead deserve great credit for their labors in metamorphic Entomology, but it appears to me that a link is missing—the *admixture* of the sexes prior to the deposition of the eggs. Were the *dryas* females the selection of *comma* males?

As illustrating the confusion in which the species of *Grapta* stand at present, two specimens sent to Mr. Edwards were stated by him to be *progne* and *gracilis*, and two similar ones sent to Mr. Strecker were reported as *faunus* and *comma*. *Faunus* is taken on Anticosti, and I am therefore inclined to think that the latter is dimorphic with *gracilis*. I found a larva of a *Grapta* feeding on wild currant, on Anticosti, a description of which was sent to Mr. Edwards, of West Virginia, who says: "I don't know what to make of the larva of *Grapta* you describe.

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were as follows: "It was ascertained that silk worms fed on vine leaves yielded silk "of a red color; when they had lettuce alone they gave cocoons of an emerald green; "nettle leaves produced violet silk, and it was also found that numerous combinations "of colors were the result of a varied diet of mixed leaves, fed during the last 20 "days of the larva period. Yellow, red, green and violet seem to be the colors most "successfully produced."

"It would not appear to be that of *progne*, which feeds on currant, as that "is olive brown in color, and this color covers nearly all the surface. "*Comma* has a yellow skin in some of its phases, with black marks. At "other times it is black, with yellow marks. It varies greatly. I do not "know that it feeds on currant. *Faunus*, Scudder thinks, is dimorphic "with *gracilis*. I don't. The larva of *faunus* feeds on willow. It may "have other food plants, but so far we only know of willow; and it "looks like the larva of *C. album*, of Europe; that is fore-half rusty "red, hind-half white, so that your description does not fit that."

Mr. Edwards, in his remarks on larvae raised from the females of *interrogationis*, describes them as exhibiting "every distinct type of "coloration, and that either type of larvae produced either sex or form "of butterfly indifferently." *G. interrogationis* has been found feeding on several plants, one of which is *Tilia pubescens*, and it will surely be conceded that there is a marked difference between the taste of the leaves of the hop and linden. If the color of a larva is affected by food taken into its system, does it not appear reasonable that the imago issuing from it will be more or less marked? Say, for instance, that *Grapta comma* feeds on two distinct plants, and that a male whose larva fed on the hop, took for its mate a female which fed on elm. In all probability a versicolor butterfly would be the result, although the form would be that of *comma*. It is on the ground of finding northern species confined to a single plant, and which presents no varieties, that I conclude that such as are extremely phytophagic are those which produce the greatest number of varieties, while their forms are lessened or extended in accordance with geographical situation. *

There are a few other well marked species inhabiting the north belonging to *Lycaenidæ* and *Hesperidæ*, but as the previous remarks apply equally to them, I shall not extend the matter. My object is to ventilate

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* NOTE,—Coleman, in his "British Butterflies," remarks on the variety *Gonopteryx cleopatra*, of Europe, that M. Boisduval has proved that *G. rhamni* and the former are identical, and in a foot note adds that "they are two varieties, but "why they fly together he cannot explain; but it is possible there may be a con-"stitutional difference between individual insects, just as we see that of two English-"men going to a hot climate—one will brown deeply, while the complexion of the "other will hardly alter, although exposed to the very same external influence." In another portion of Coleman's book he thinks it possible that *Colias edusa* var. *helice* may be a male between *C. edusa* and *C. hyale*.

the subject, in order that it may be more thoroughly investigated by those who have leisure. The theory advanced is, I think, a reasonable one, and is based upon what I have noticed in my rambles during a number of years in the woods and fields.

MICRO-LEPIDOPTERA.

BY V. T. CHAMBERS, COVINGTON, KENTUCKY.

(Continued from page 77.)

ERRATA.

Page 73, line 1, for "costa" read *costal vein.*
" " 3, for "costal" read *subcostal.*
" " 23, for "place" read *plead.*
Page 75, line 7 from the bottom, for "there" read *then.*

PHILONOME, *gen. nov.*

The little insect which I have made the type of this new genus, unites in itself the characters of several genera.

Tongue naked, about as long as the maxillary palpi, which nearly conceal it. The maxillary palpi are about as long as the labial palpi and in the dead insect are laid upon the coxae; they are rather densely scaled, the scales being somewhat roughened. The labial palpi ascend about half way to the vertex; the first and second joints are short; the second has a minute tuft at the end beneath, and the third is about as long as the first and second together, and somewhat roughened with scales. Face broad, smooth, with appressed scales and much retreating; vertex roughened, with a large tuft of erect scales which extends down between the base of the antennae; no ocelli; eyes moderate, visible from beneath, but concealed above by the large eye-cap which clothes the somewhat swollen basal joint of the antennae. Stalk of the antennae simple, about two-thirds as long as the primaries.

Primaries lanceolate, almost caudate; the costal vein runs near the margin, which it reaches at about its middle. The subcostal sends two branches to the costal margin from near the end of the discal cell, which is closed rather acutely by the union of the subcostal and median veins. The first of these branches is given off at the point where the subcostal bends towards the median, and the second is given off almost from the apex of the cell. The median vein is unusually large and distinct, and from just behind the middle it sends a branch to the dorsal margin, from the end of the cell it sends a furcate branch also to the dorsal margin; from the apex of the cell a discal branch, which is almost continuous with the median, passes to apex, becoming trifurcate near the apex, one of its branches going to the costal margin near the apex, one to the apex and one to the dorsal margin near the apex. One or more tufts of raised scales.

Hind wings linear lanceolate; costa somewhat naked from the base to the basal fourth, and from thence excavated to the apex; the costal vein is close to the costa and enters it about the basal fourth; the subcostal proceeds to the apex; behind the middle it sends two branches to the dorsal margin; the median is furcate behind the middle, close to the margin, both branches entering the dorsal margin. Cell unclosed.

P. Clemensella. N. sp.

Palpi, face and eye-caps white; tuft reddish orange; antennae pale reddish orange; thorax white, with a reddish orange narrow stripe just before the apex, and a spot of the same hue on each shoulder. Primaries reddish orange, with two white basal streaks, one median, the other dorsal, the latter continuous with the white of the thorax, and extending to a small raised tuft of brown scales just before the middle of the dorsal margin; from the tuft the dorsal white streak is deflexed obliquely to about the middle of the wing, where it intersects at an acute angle the median basal white streak; at the apical third of the costa is a rather long oblique costal white streak, which is produced along the extreme costa towards but not to the base; apical portion of the wing dusted with dark brown. Ciliae whitish, with an oblique, rather wide streak of reddish orange, dusted with brown, resembling the "hook" of many species of *Gracillaria*.

Al. ex. scarcely ⅓ inch. Kentucky. Larva unknown.

I have named it in honor of Dr. Clemens, who may be called the father of this branch of Entomology in this country.

ARCTIA ARGE, Drury.

BY PROF. S. H. PEABODY, AMHERST, MASS.

A moth taken by an evening lamp, May 25, 1873, on that night and the next day laid eggs which hatched June 14. The larvæ fed freely on the leaves of the common narrow-leaved plantain, *Plantago lanceolata*. The earlier moults were not observed with care; the last two occurred June 23 and July 1.

July 6, the larvæ ceased feeding and next day began to spin their cocoons in the breeding cage. July 26, imagos appeared, copulated and laid eggs for a second brood. Other imagos appeared at about the same time from without, showing the species to be double brooded. The cycle of transformations occupied 42 days from the hatching, 62 from the laying of the egg.

When the larvæ ceased feeding they were 1¾ inches long, ¼ inch in diameter, tapering slightly to each end.

Head small, black, marked in front with an impressed inverted Y. Fore legs black; pro-legs yellow with black fringe.

Body dark brown; a white dorsal stripe, and midway to spiracles a white lateral stripe, shaded to orange on each segment; spiracles black; an orange spot above each, and a wavy white line beneath. Underneath dirty gray; on each segment twelve black tubercles, two on each dark stripe, clothed with long white hairs.

The moth is quite abundant in this locality.

EDITORIAL SUMMARY.

The Butterflies of North America, *by W. H. Edwards—Second Series.*—We are much pleased to be able to announce that the first part of the second volume of this admirable work will be issued during the present month, by Messrs. H. O. Houghton & Co., Riverside Press, Cambridge, Mass., the succeeding parts to appear quarterly, with five plates in each part. The illustrations which adorn the pages of Vol. 1 are admirably truthful and life-like, and we have no doubt but that the forthcoming volume will in this respect quite equal its predecessor. The talented artists who were engaged upon the plates of the previous volume,

Miss Mary Peart and Mrs. Bowen, will execute the plates of this also. Illustrations of the eggs and larvæ, as well as the butterfly, in many cases will be given, which will add greatly to the interest of the work. Price $2.50 per part. We bespeak for this volume an enlarged circulation.

FRANCIS WALKER, of the British Museum, has lately published a supplement to his Catalogue of Hemiptera; also the first part of a general list of Diptera. Copies of these pamphlets may be had from E. W. Janson, 28 Museum Street, London, W. C., England.

WE HAVE received a copy of a Memorial to the Legislature of Massachusetts from the American Academy of Arts and Sciences, setting forth the desirability of a new and thorough survey of the state in which besides the usual geological matter, there should be "full descriptions and truthful illustrations of the animals and plants, including their natural history, transformations, and relations to man and his requirements, said reports to be prepared with special reference to an intelligent use by the people." The State could not make a wiser use of its funds. We heartily wish the memorialists success, feeling sure that in such a publication Entomology will receive its due share of attention.

A NEW ENTOMOLOGICAL MONTHLY.—We are pleased to learn that the Cambridge Entomological Club, organized last autumn, have determined to issue an organ to be called "Psyche," a 4-paged monthly, to begin with. The first number will be issued in a few weeks. We commend the Cambridge Club for their enterprise, and shall gladly welcome their little sheet, and sincerely hope it may live and grow.

BULLETIN OF THE BUFFALO SOCIETY OF NATURAL SCIENCES.—We have received No. 4, which completes the first volume of this valuable publication. The present part contains eight plates, making eleven in all which have appeared in the volume of 289 pages. No. 4 contains the following Entomological papers: "On the Butterflies of Anticosti," "On Eight Species of Noctuidæ," and "Determination of Brazilian Sphingidae Collected by Mr. Chas. Linden," by Aug. R. Grote; "Notes on the Species of Pasimachus," by John L. Le Conte, M. D.; "The Two Principal Groups of Urbicolae," "Note on the Species of Glaucopsyche from Eastern North America," by Samuel H. Scudder; "Notes on North American Lepidoptera," "Description of Two New Noctuidae from the Atlantic District," by H. K. Morrison; "New Phalaenoid Moths,"

"Rectification of Treitschke's Use of Hubner's Generic Term 'Cymatophora,'" by Leon F. Harvey, M. D. Price of this volume complete, Three Dollars. Part 1 of vol. 2 is now in hand, and will shortly appear; it will contain, among other articles, a catalogue of the Noctuidae of North America, embracing nearly 800 names, by Aug. R. Grote, with one colored plate. The subscription for the new volume will be Four Dollars. Remittances should be sent to Leon F. Harvey, M. D., Buffalo, N. Y.

CATOCALA RELICTA.—Mr. Robert Bunker, of Rochester, N. Y., has sent us a very nice photograph of an unusually dark female specimen of *relicta*. He says: "It is well known that this species alights usually on white surfaces; the specimen from which this photograph was taken was captured on a surface as dark as itself."

BOOKS RECEIVED.

Proceedings of the Boston Society of Natural History, vol. xvi, part 2, June, 1873—Jan., 1874, with two plates and several wood-cuts.

On the Oviposition of the Yucca Moth, from the American Naturalist, pp. 4, by Prof. C. V. Riley.

Controlling Sex in Butterflies, from the American Naturalist, pp. 9, by Prof. C. V. Riley.

The Grape Phylloxera, from the Popular Science Monthly, pp 16, with seven cuts, by Prof. C. V. Riley.

The Grape Phylloxera, False Theories. From the New York Weekly Tribune, by Prof. C. V. Riley.

Lepidoptera, Rhopaloceres and Heteroceres Indigenous and Exotic Part 9, with one colored plate containing figures of eleven species of Catocala, by Herman Strecker, Reading, Pa.

Note on the Species of Glaucopsyche from Eastern North America, 8vo., pp. 2, by Samuel H. Scudder, Cambridge, Mass.

The Two Principal Groups of Urbicolæ (Hesperidæ, Auct.,) 8vo., pp. 2, by Samuel H. Scudder, Cambridge, Mass.

The Pterostichi of the United States, from Proc. Acad Nat. Sci., Philadelphia, July 27, 1873, pp. 19, by John L. Leconte, M. D.

Synonymical Remarks upon North American Coleoptera, from Proc. Acad. Nat. Sci., Phila., pp. 16, by John L. Leconte, M. D.

Notes on the Species of Pasimachus, from Bul. Buffalo Soc. Nat. Sci., pp. 8, by John L. Leconte, M D.

On the Origin of Insects and Remarks on the Antennal Characters in the Butterflies and Moths, from Proc. Amer. Assoc., pp. 3, by Aug. R. Grote.

The Natural History of a Polymorphic Butterfly, from the American Naturalist, May, 1874, pp. 10, by Samuel H. Scudder.

Report Dept. Agriculture, Washington, April and May.

Science Gossip, March and April.

Nature to April 16th.

Le Naturaliste Canadien, Mars et Avril.

The Zoologist, March and April.

Newman's Entomologist, March and April.

Journal of Education, Feb'y.

Prairie Farmer to May 9.

Indiana Farmer to May 2.

Canada Farmer to May 1.

Western Rural to May 9.

Bruce Reporter to May.

The Canadian Entomologist.

VOL. VI. LONDON, ONT., JUNE, 1874. No. 6

ON SOME OF OUR COMMON INSECTS.

16.—THE GOOSEBERRY SAW-FLY (Nematus ventricosus, Klug.)

BY THE EDITOR.

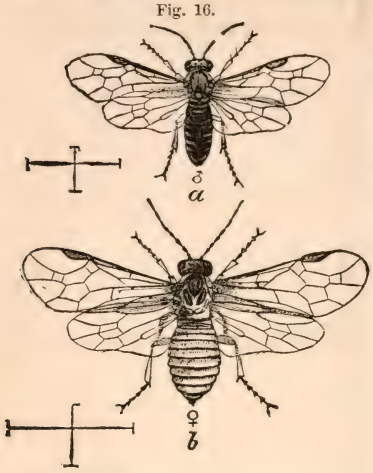
This prolific pest, known also in the larval state as the Currant Worm, is now so widely disseminated, and, at this particular season of the year, so abundant and destructive, that it may well be classed among our commonest insects, and is one in which all cultivators of the gooseberry and currant must take some interest.

The Saw-flies, the parents of this troublesome brood, usually spend the winter in the chrysalis state, enclosed in a tough, papery-looking, silken cocoon, sometimes on and sometimes under the surface of the ground, and occasionally fastened on the stems of the currant or gooseberry bushes on which they have been feeding, or in some sheltered spot near by. They make their appearance very early in the season, usually about the third week in April, but sometimes a week later, depending on the temperature; and by the time the gooseberry bushes are bursting into leaf, these enemies have paired, and the females are ready to deposit their eggs on the new and tender foliage. The gooseberry bushes develope leaves before the currant bushes, and whether it is from this cause alone or from a preference for the gooseberry foliage, we know not, but we find that the gooseberry is the first attacked, and often, if let alone, many bushes will be stripped quite bare of foliage before the eggs deposited on the currant are hatched; on this account the gooseberry bushes require the first attention.

Both male and female flies are represented in fig. 16, but magnified. The upper one (*a*) is the male, *b* the female; the hair lines below show

their natural size. The male is nearly as large as the common house-fly, but with a more slender body and glossier wings. Its head is black, spotted with dull yellow, with the antennae brownish black; the thorax or anterior portion of the body is black, with a yellow spot at the base, and in front of each of the fore wings; the abdomen or hinder portion is black above, yellowish underneath and at the tip. Its legs are bright yellow; the wings glossy, with black or brownish black veins. The female is larger than the male and differs from it chiefly in the color of the body, being mostly yellow, instead of black. These flies are active only during the warmer parts of the day; at other times they are quiet, indeed almost torpid.

Fig. 16.



The eggs are laid on the surface of the larger veins or ribs on the underside of the leaves; they are arranged in long and regular rows, as shown in fig. 17, each female depositing about a hundred or more. We have counted as many as 118 squeezed from the body of a female just escaped from the chrysalis, and as the eggs are then very soft and easily ruptured, it is probable that some of them were broken in counting, and thus escaped notice. This process of egg-laying is continued throughout May, so that you have eggs hatching almost daily during the latter part of the month, on bushes which are, perhaps, covered with worms from half an inch to an inch long. It is probable that the female fly lays her stock of eggs at one time, and that the subsequent deposits are made by those who have escaped later from the pupa state. The eggs, as found on the leaves, are about one-twentieth of an inch long, four times as long as broad, rounded at each end, and having a

Fig. 17.

whitish glossy surface. As squeezed from the body of the insect they are not much more than half this size, which indicates that they must expand considerably after being laid. The exterior of the egg is thin and elastic, and contracts and shrivels up as the young larva escapes ; the usual duration of the egg stage is from a week to ten or twelve days.

The larvae or worms, when first hatched, are about one-twelfth of an inch long, with a greenish white, semi-transparent body and a large head, having a dark round spot on each side. At first they eat small holes in the leaf on which they are placed, as shown at 2 and 3, fig. 17, feeding in company, from 20 to 40 on a leaf, the soft parts of which they soon consume, leaving nothing but the frame-work ; as they increase in size they eat the veins as well down nearly to the foot-stalks, and, travelling from leaf to leaf, they soon strip the branch on which they have been located, when they spread to other parts of the bush, which is sometimes stripped quite bare of foliage by these marauders in a few days.

Fig. 18 represents the larva nearly full grown. It is then about three-fourths of an inch long, with a black head and a bluish green body,

Fig. 18.

becoming yellowish on the hinder segments and on the sides. Its whole upper surface is thickly covered with small, shining black tubercles or raised dots, from each of which arises a single black hair. Low down on each side, in a line with the spiracles, is a row of larger black tubercles from each of which there arises several short black hairs ; the terminal segment has a patch of black above. The under surface is pale bluish green, growing yellowish towards the extremities, with a few faint brownish dots ; feet nearly covered with patches of black. Prolegs—of which there are seven pairs—pale greenish. After the last moult, just before entering the chrysalis state, it becomes of a uniform plain green color, tinged with yellow.

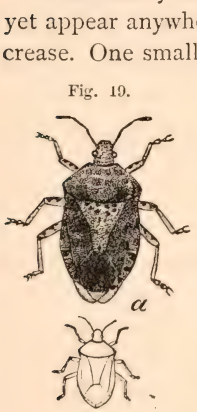
Having completed its growth, its chief concern now is in the selection of a suitable place in which to pass the chrysalis stage of its existence.

Such a spot having been fixed on, the larva begins to contract the length of its body and to spin a cocoon over itself, which, when finished, is nearly oval, smooth, of a brownish color and papery texture, and within this it changes to a small brown chrysalis, from which the fly escapes late in June or early in July. Shortly after this eggs are again deposited, from which another brood of worms are hatched; these complete their growth before summer closes, and in most instances change to chrysalids before winter, and thus these tormentors lie dormant until spring comes round again.

There may possibly be more than two broods during the season; it is certain that there are not many weeks during the whole of summer when you cannot find the larvae on the bushes in some stage of their growth. It is well known that the flies composing the separate broods do not all appear at one time; some are weeks later than others, and their progeny are later in proportion; but whether this tardiness in maturing on the part of some specimens is sufficient to account for the almost continual presence of the larvæ from May to September, we are unable at present to decide.

The Saw-fly has natural enemies, but, unfortunately, they do not as yet appear anywhere in sufficient numbers to materially lessen its increase. One small parasitic insect attacks the egg, and there are two other species which prey upon the larva. Besides these we have another friend in a member of the Heteroptera or true bug family, see fig. 19. This insect is about the size of a common Lady-bird, with the head, thorax and legs black, and the abdomen red, with an elongated black spot in the centre, crossed by a whitish line. On approaching one of the worms they thrust into it their sharp proboscis and quietly suck its juices until it shrivels up and dies. In the figure this insect is magnified; the outline below shows its natural size.

Fig. 19.



It is fortunate that we have a remedy which is sure and speedy, and while it brings sudden death to the worm, does not injure either the bushes or fruit. We refer to powdered Hellebore, which is best used by mixing two tablespoonfuls of the powder in two or three gallons of water, and showering it on the bushes with a watering pot.

ON TWO NEW SPECIES OF NOCTUIDÆ.

BY H. K. MORRISON, OLD CAMBRIDGE, MASS.

Hydræcia semiaperta. Nov. sp.

Antennae serrate. Collar arched, ochreous at its base, brown above. Behind the collar the usual longitudinal sharp-edged thoracic crest. Abdomen with a thick, short tuft on its first segment. ♀ with an extended ovipositor. Anterior wings above brown, with ferruginous shades. All the transverse lines dark brown, regular and distinct. Half line present. Interior line undulate above the median nervure; at the latter point it is bent inwardly, and advances in a nearly straight line to the inner margin. Median shade very distinct, broad, not clearly defined along its edges, strongly angulated on the median nervure, and then nearly touching the reniform spot. Exterior and subterminal lines obliterated on the costa, below distinct, sub-parallel, broadly undulating, the former dentate between the median branches.

Ferruginous stains on the median and subterminal spaces, particularly just before the subterminal line and between and beyond the ordinary spots. Terminal space in fresh specimens showing a purple reflection. Orbicular spot small, ferruginous, ringed with brown. Reniform spot long and narrow, pure white, crossed by the black nervules, its upper half frequently more or less overspread with ferruginous shades. Nervules black, with irregularly occurring white atoms. Fringes long, edged with a basal and exterior black line.

Posterior wings dark fuscous, lighter at the base; a black line at the base of the brown fringe.

Beneath, the most conspicuous feature is the broad, black, wan exterior line, which extends over both wings. Discal dots present. On the anterior wing, before the exterior line, the wings are blackish. The costa subterminal and terminal spaces of the anterior, and the whole of the posterior wings violaceous brown, sprinkled with numerous black atoms.

Expanse, 34 to 37 m. m. Length of body, 16 m. m. *Hab.* Mass., New York. Not uncommon. Coll. of H. K. Morrison.

In color this species most nearly approaches *sera*, G. & R.; in the form of the spots, *lorea*, Guen.

The white reniform spot is not a sexual character, as in *nictitans*, Linn., but common to both sexes.

The regular, distinct, median lines, particularly the broad angulated median shade, the white reniform, and the continuous exterior line beneath, afford a ready clue to its determination.

Hadena congermana. Nov. sp.

Palpi, vertex, the upper portion of the collar, and the tegulae ferruginous brown. The basal portion of the collar, a broad, dorsal, thoracic band, and the abdominal tufts dull ochreous. Anterior wings uniform dull red, with the nervules brown. The transverse lines, with the exception of the subterminal, almost entirely obliterated, represented by white dots on the costa and nervules, but in some cases the ground color is slightly lighter along the ordinary course of the lines. Subterminal line more distinct, showing the usual ≷-shaped marking between the median nervules, set off and followed by a lighter line. Terminal space lighter than the rest of the wing, particularly at the apex and internal angle, where are formed irregular ochreous spots. Orbicular spot reduced to a pale dot, encircled with brown. Reniform as in the common *sputator* Grote (*Bul. Buf. Soc. Nat. Sci., vol. i, p. 190*), kidney-shaped, with an internal brown annulus following the shape of the spot. Posterior wings white at the base, with a broad, diffused light fuscous terminal band. Beneath the wings are yellowish white, with reddish atoms terminally and traces of the exterior line. Expanse, 35 to 38 m. m. Length of body, 18 m. m.

A rare species. *Hab.* New York, and one specimen taken at Beverly, Mass., June 24, 1867, by Mr. Edward Burgess, who has generously given me this and many other interesting species of Noctuidae.

A very detailed description of this species is not necessary; it is another member of the same little closely related group of *Hadena*, of which *dubitans*, Walk., and *sputator*, Grote, are the only species. It is the smallest of the group (expanding 35 to 38 m. m., while *sputator* expands 42 to 46 m. m., and *dubitans* 48 to 50 m. m.,) but it resembles nearest in color *dubitans*, the largest.

Its best character is the orbicular spot, reduced merely to a whitish dot, surrounded with a brown ring. In the other species the orbicular, although obscured by the ground color, is of the usual size. It can be easily distinguished by the dull red ground color of the anterior wings, the almost white posterior wings, the dorsal thoracic band, and the white conspicuous reniform.

THE PRESERVATION OF CATERPILLARS BY INFLATION.*

BY SAMUEL H. SCUDDER.

Many persons are deterred from collecting caterpillars by the difficulty and expense of preserving them in the ordinary way. The easy and inexpensive method of blowing up and mounting the pellicle is so little known in this country, that at the last meeting of the American Association, only one entomologist besides myself had ever seen the operation; since then others have tried it, and been delighted with its simplicity. In the hope of inducing all our entomologists to experiment for themselves, the following explanation of the process has been prepared.

It should be premised that caterpillars may be prepared in this way, so as to retain their colors far better than by any other method, and often to to be fit subjects at any subsequent time for the artist's pencil; the most delicate processes may be preserved uninjured, and the examination of hairy or spiny appendages made even more readily than during life. Specimens taken from spirits, unless absolutely naked, are always difficult to examine from the matting of the hairs; and the internal organs can seldom be studied, even in the rudest manner, unless the greatest care has been bestowed upon their preservation; in fact, no specimen can be fitted by any process for the study of both internal and external organizations, and for the latter, no method of preparation compares with that of inflation.

The instruments necessary for the operation, besides the tools in the hands of every entomologist, are a small tin oven, a spirit lamp, a pair of finely pointed scissors, a bit of rag, a little fine wire and a straw.

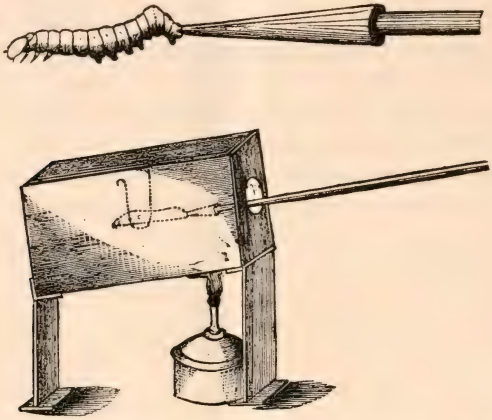
The oven is simply an oblong tin box, about 2½ inches high, 2½ inches wide, and five inches long; the cover is of glass, and one end of the box is perforated by a circular hole 1¼ inches in diameter. It would be well to have this end of glass, and the opposite end should be movable; the oven rests upon an open standard of twisted wire or riveted tin plates, as in the woodcut (fig. 20.) No soldering should be used upon the oven or standard, as it would soon be melted. Mr. Riley suggests that there would be an advantage in having the front end of the standard higher than the back, as he has shown in the sketch. He also proposes

*From advance sheets of the *American Naturalist*.

a movable wire loop, indicated in the woodcut by the dotted line,* but this would seem superfluous.

The wire should be very fine and annealed; the best is that wound with green thread and used for artificial flowers. It should not be more

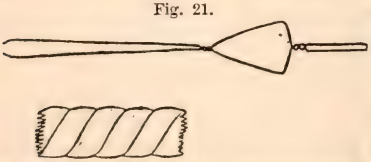
Fig. 20.



than half a millimetre in diameter; the cut represents it magnified nineteen diameters (fig. 21).

The straw. Mr. Goossens, of Paris, my courteous instructor in this art, who possesses a collection of nearly a thousand species of inflated caterpillars, uses nothing but ordinary wheat straw, choosing stout, dry pieces of various sizes, the cross section of which is perfectly circular; with these he inflates the smallest micros and the largest sphingidae.—Various modifications have been suggested; a glass tube drawn to a fine point, and provided with a pair of spring clips to attach to the caterpillar, is a favorite form; the Germans use this largely, and sometimes attach the caterpillar by threads passed around the anal prolegs. Dr. LeConte informs me that Dr. Gemminger uses a finely pointed tube with an elastic bulb attached, like a rubber syringe. Mr. Riley suggests (as his drawing represents) still another mode, which is to pierce a piece of soft wood along the grain with a fine heated wire

Fig. 21.



* The engraver should have made this loop hang from the edges of the oven.

and then sharpen to a point the tube thus formed, to be inserted in the caterpillar; a tube is also inserted in the other end (see fig. 21.) For myself I prefer the simple straw.

The operation. Kill the subject by a drop of ether or by a plunge in spirits; if it be a hairy caterpillar, it should remain at least half an hour in alcohol, and then rest on bibulous paper for forty-eight hours; otherwise the hairs drop off in the subsequent operation. Then placing the caterpillar in the left hand, so as to expose its hinder extremity beyond the gently closed thumb and first two fingers, enlarge the vent slightly at the lower edge by a vertical cut with the scissors; next lay the larva either upon bibulous paper on the table, or upon soft cotton cloth held in the left hand, and press the extremity of the body with one finger, always with the interposition of cloth or paper, so as to force out any of the contents of the rectum; this process is continued from points successively farther back, a slight additional portion of the contents of the body being gently pressed out with each new movement. Throughout all this process great care should be taken lest the skin should be abraded by too violent pressure, and lest any of the contents of the body soil its exterior or become entangled in the hairs or spines; to avoid the latter, the caterpillar should be frequently removed to a clean part of the cloth or paper. When a portion of the intestinal tube itself becomes extruded, it should be seized with a pair of strong forceps, and, the head remaining in the secure hold of the left hand, the tube should be forcibly but steadily torn from its attachments; with this most of the contents of the body will be withdrawn, and a delicate pressure passing from the head toward the tail will reduce the subject to a mere pellicle.

The alcohol lamp is now lighted and placed in position beneath the oven; a straw is selected, of the proper size to enter the enlarged vent, and the tip, after being cut diagonally with sharp scissors, is moistened a little in the mouth (to prevent too great adhesion of the skin to the straw) and carefully introduced into the opening of the caterpillar; the process may be aided by blowing gently through the straw. When the skin is slipped upon all sides of the straw to the distance of nearly a quarter of an inch, without any folding of the skin and so that both the anal prolegs protrude, a delicate pin (Edelston and Williams, No. 19, is best) is passed through the anal plate and the straw.

By this time the oven will be sufficiently heated to commence the drying process, which consists simply in keeping the caterpillar in the

oven, extended horizontally upon the straw by blowing gently and steadily through the straw, as one uses a blow-pipe. Too forcible inflation will make the caterpillar unsightly by distending unnaturally any spot that may have been weakened or bruised in the previous operation; the caterpillar should be kept slowly but constantly turning, and no harm will result from withdrawing the creature from the oven and allowing it to collapse, to gain breath or rest; only this relaxation should be very brief. The caterpillar should be first introduced into the oven while inflated by the breath, and so placed that the hinder extremity shall be in the hottest part, directly above the flame, for it is essential that the animal should dry from behind forward; yet not altogether, for as soon as the hinder part has begun to stiffen (which can readily be detected by withholding the breath for a second) the portion next in front should receive partial attention, and the caterpillar moved backward and forward, round and round over the flame. During this process any tendency of the caterpillar to assume unnatural positions may be corrected—at least in part—by withdrawing it from the oven and manipulating it; during inflation, the parts about the head should be the last to dry and should be kept over the flame until a rather forcible touch will not cause it to bend.

To secure the best results, it is essential that the oven should not be too hot; the flame should not be more than an inch high, and its tip should be one or two inches from the bottom of the oven.

When the skin of the caterpillar will yield at no point, it is ready for mounting. The pin is removed from the straw and the caterpillar skin, which often adheres to the straw, must be gently removed with some delicate, blunt instrument, or with the finger nail.

A piece of wire a little more than twice the length of the caterpillar is next cut, and, by means of forceps, bent as in fig. 21, the tips a little incurved; a little shellac* is placed at the distal extremity of the loop, the wire is held by the forceps just beyond this point, so as to prevent the free ends of the wire from spreading, and they are introduced into the empty body of the caterpillar as far as the forceps will allow; holding the loop and gently opening the forceps, the caterpillar is now pushed over the wire with extreme care, until the hinder extremity has passed half-way over the loop, and the shellac has smeared the interior sufficiently to hold

* To prepare this, the sheets of dark shellac should be preferred to the light, and dissolved in forty per cent. alcohol.

the caterpillar in place when dry: the extremities of the parted wires should reach nearly to the head. Nothing remains but to curve the doubled end of the wire tightly around a pin with a pair of strong forceps and to place the specimen properly labelled, in a place where it can dry thoroughly for two or three days before removal to the cabinet.

For more careful preservation and readier handling, Mr. Goossens employs a different method, placing each specimen in a glass tube, like the test tube of the chemist. The wire is first bent in the middle and the bent end inserted in a hole bored in the smaller end of a cork of suitable size, so as nearly to pass through it; the loops are then formed as above; both ends of the cork are varnished, and a label pasted around the portion of the cork which enters the tube, thus guarding both specimen and label from dust, and the latter from loss or misplacement. After two or three days the cork with the caterpillar attached is placed in its corresponding tube, and the tube may be freely handled.

Modifications of this system will occur to every one. Dr. Gemminger uses a syringe for the extraction of the contents as well as for the inflation of the emptied skin. For an oven, the Vienna entomologists employ an ordinary gas-chimney, open at both ends and inserted in a sand bath, which prevents, perhaps, the danger of too great heat.

TRANSLATION OF THE SYNOPSIS OF THE GENERA OF EUROPEAN MYCETOPHILIDÆ.

BY FRANCIS WALKER, LONDON, ENGLAND.

The Diptera, generally considered, are less attractive than other orders of insects, and appear to be more insignificant, but are the most useful on account of their excessive abundance and of their purification of matter and thereby of the atmosphere. In like manner, the Diptera may be divided into more or less numerous and beneficial tribes, and the work assigned to the former is the removal of decaying substances. The fungus race is in subjection to the Mycetophilidæ, and are the means for the developement of the perfect state of the latter, according to the law whereby degradation precedes the attainment of a higher state, and this law is exemplified in minerals, plants and animals. In like manner the

Mycetophilidæ among themselves exhibit much difference in utility and beauty, the former quality being exemplified by Mycetophila with its skipping and shuffling movements; the latter by the graceful form of Macrocera when it rests on a shady paling. The four following sub-families of Mycetophilidæ are distinguished from the others by each of them including more than one genus:

Sub-family MYCETOBINÆ.

A—Brachial vein and cubital vein forming a sessile fork... 1 MYCETOBIA
B—Brachial vein and cubital vein forming a petiolated fork.
a—Base of this fork nearer to the base of the wing than is the base of the 2nd hind areolet..... 2 DITOMYIA
b—Base of this fork more distant from the base of the wing than is the base of the 2nd hind areolet..... 3 PLESIASTINA

Sub-family CERATOPLINÆ.

A—Mouth elongated like a beak..... 1 ASINDULUM
B—Mouth not elongated like a beak.
a—Antennæ dilated; palpi not bent together..... 2 CEROPLATUS
b—Antennæ not dilated; palpi bent together..... 3 PLATYURA

Sub-family SCIOPHILINÆ.

A—Costal vein extending to the tip of the wing..... 1 SCIOPHILA
B—Costal vein not extending to the tip of the wing.
a—Base of the 4th hind areolet much nearer to the base of the wing than is the base of the 2nd hind areolet.....2 EMPHERIA
b—Base of the 4th hind areolet a little nearer to the base of the wing than is the base of the 2nd hind areolet.
*—Second hind areolet with a very long petiole..... 3 POLYLIPTA
* *—Second hind areolet with a moderately long petiole.....5 EMPALIA
c—Base of the 4th hind areolet in a transverse line with the base of the 2nd, or very near the base of the wing..... 6 TETRAGONEURA
d—Base of the 4th hind areolet much more distant from the base of the wing than is the base of the 2nd hind areolet..... 4 LASIOSOMA

Sub-family MYCETOPHILINÆ.

A—Three ocelli on the front.
a—Abdomen with seven segments.

*—Proboscis not elongated.
†—Costal vein extending beyond the tip of the cubitus.
‡—Basal part of the cubital vein and middle transverse vein equally long.
§—Auxiliary vein not extending to the costal vein..... ..1 SYNTEMMA
§§—Auxiliary vein extending to the costal vein .....3 ANACTINIA
‡‡—Basal part of the cubital vein longer than the middle transverse vein.
§—Base of the 4th hind areolet under the base of the cubital vein.....2 LEPTOMORPHUS
§§—Base of the 4th hind areolet nearer to the base of the wing than is the base of the 2nd hind areolet.....4 BOLETINA
§§§—Base of the 4th hind areolet more distant from the base of the wing than is the base of the 2nd hind areolet..6 PHTHIRIA
††—Costal vein not extending beyond the tip of the cubitus.....7 GLAPHYROPTERA
**—Proboscis elongated.....5 GNORISTE
b—Abdomen with six segments.
*—Hind vein forked.
†—Fork long.....8 LEJA
††—Fork short.....9 COELOSIA
**—Hind vein not forked.
†—Middle discoidal vein forked.....10 AENEMIA
††—Middle discoidal vein not forked.....11 AZANA
B—Three ocelli: one on the inner border of each eye; the third in the middle of the fore front.
a—Costal vein extending much beyond the tip of the cubital vein.
c—Two ocelli; one on the inner border of each eye.
a—Base of the 4th hind areolet nearly in a transverse line with that of the second hind areolet.....25 MYCETOPHILA
b—Base of the 4th hind areolet much more distant from the base of the wing than is the base of the 2nd hind areolet.....26 DYNATOSOMA
c—Base of the 4th hind areolet much nearer to the base of the wing than is the base of the 2nd hind areolet.....27 CORDYLA
†—Petiole of the second hind areolet long.....20 EXECHIA
††—Petiole of the 2nd hind areolet short.....24 MYCOTHERA
****—No 4th hind areolet.

†—Fore cubital areolet moderately broad.....21 Zygomyia
††—Fore cubital areolet very narrow.....22 Sceptonia
‡—Hind vein not forked.
‡—Hind vein forked.....23 Epicypta
*—Base of the 4th hind areolet in a transverse line with that of the 2nd hind areolet.....12 Dacosia
**—Base of the 4th hind areolet more distant from the base of the wing than is the base of the 2nd hind areolet.18 Anatella
b—Costal vein extending a little beyond the cubital vein.....19 Phronia
c—Costal vein not extending beyond the tip of the cubital.
*—Base of the 4th hind areolet a little nearer to the base of the wing than is the base of the 2nd hind areolet.
†—Petiole of the 2nd hind areolet very short.....14 Rymosia
††—Petiole of the 2nd hind areolet moderately long.....15 Allodia
**—Base of the 4th hind areolet much nearer to the base of the wing than is the base of the 2nd hind areolet.
†—Costal vein ending much before the tip of the wing..13 Brachypeza
††—Costal vein ending a little before the tip of the wing.....16 Brachycampta
***—Base of the 4th hind areolet and that of the 2nd about equally distant from the base of the wing.....17 Trichonia
****—Base of the 4th hind areolet much more distant from the base of the wing than is the base of the 2nd.

NOTES ON COLLECTING LEPIDOPTERA.

BY G. M. DODGE, GLENCOE, DODGE CO., NEBRASKA.

In collecting Catocalas at Ohio, Ill., I have found them, during July, invariably abundant upon Black Locust (*Robinia pseudacacia*), which, at that time, exudes considerable sap from the holes made by borers. Last season I pinned rags, dipped in molasses, to three or four of these trees, and from the middle to the last of July obtained from them over thirty Catocalas of ten species. On suitable evenings I would visit the trees with a lantern and cyanide bottle; several times between sunset and ten

o'clock, p. m., earlier or later, I had little success. I seldom used a net, preferring that a specimen should escape rather than capture it in a damaged condition.

In August and September decayed apples or pomace from the cider mill, spread upon trunks of trees, will attract the late species of Catocala such as *cara*, *concumbens*, &c., and a host of the lesser Noctuidae.

Limenitis misippus and *ursula* are also very fond of the juice of apples. I have often seen the former species feeding upon apples that were being sun dried, and both may be observed around apple trees upon which the fruit is over-ripe. Upon more than one occasion, by wetting my fingers with apple juice, and holding them near an *ursula*, as it sat upon a leaf above me, I have induced it to leave its perch and alight on my hand, where it would remain until the last drop was sucked up. Where the rarer species of this genus are found, it would seem that apple might be successfully used as a bait.

The objection to cyanide offered by Mr. Norman, in No. 1, Vol. vi, does not seem to me a sufficient reason for discarding it. Although cyanide certainly "renders the moths rigid," the difficulty can be overcome. My Catocalas, taken in the evening, remained in the bottle all night, and next morning were transferred to a close box. At noon they were soft enough to spread without difficulty.

NEW CANADIAN NOCTUÆ.

BY AUG. R. GROTE,

Curator of Articulata, Buffalo Soc. of Natural Sciences.

Perigrapha Normani, Grote.

♂ ♀. The eyes are hairy, the tibiæ unarmed. The collar is cut out in front and there is a slight tuft in front, on the dorsum of the thorax, while the sides of the patagia are determinate. Dark leather brown; thorax concolorous, with the inner edge of the patagia with a more or less obvious bordering of dark scales. Forewings shining leather brown, deepening in tint over costal region, somewhat darker mottled. Lines distinct, continuous, geminate, with lilac-grey centers distinctly con-

trasting. Basal half line bent on median vein, continued to internal nervure. T. a. line nearly even, slightly outwardly arcuate, very slightly notched on costal and median veins. Orbicular very indistinct; it appears large, spherical, outlined by a ringed shade of a lighter brown than the ground color. Reniform large and wide, with a distinct darker inner annulus, and with an enclosed blackish stain on the median vein inferiorly. T. p. line like the first two transverse lines, exserted round the reniform, nearly even. There are three grey ante-apical costal dots, while the apices are distinctly washed with a grey shade, which obtains beyond the subterminal line over costal region on the terminal space. Terminal line very vaguely indicated. Hind wings whitish, with a vague fuscous terminal shade and the veins stained with blackish, darker in the female, fringes whitish. Beneath pale, with a common line appearing by blackish nervular dots and streaklets; a discal point on secondaries, which have whitish fringes, while beneath the fringes of the fore wings are brown (as above) and contrast. *Expanse*, 32 m. m. St. Catharines, George Norman, Esq.

Matuta. N. g.

Habitus of *Taeniocampa* and *Perigrapha;* the thoracic and caputal squamation is woolly. The eyes are, however, naked and lashed, not hairy, as in allied genera. The hind and middle tibiae are spinose, and the form is not flattened, as in *Glaea (Cerastis*, Led.) The ♂ antennae are simple, not pectinate, as in *Pachnobia.* The fore wings are broad, entire and widen outwardly, with full and rounded external margin. In color the species resembles *Ceramica picta;* the lines are obsolete, except the subterminal, which, with the ordinary spots, is grey. The thorax has the collar distinctly lobed, as in *Perigrapha*, and the sides are well defined; there seems to be no dorsal tuft, while the wings are broader than in that genus. The habit is that of *Taeniocampa* and *Lithophane;* the perfect insect has been taken by Mr. Geo. Norman, in May.

Matuta Catherina, Grote.

♂. Dark and deep red brown; the fore wings are brighter colored outside of the t. p. line, and at base below the median vein. The median transverse lines are hardly to be made out against the blackish red brown color of the wing; the t. p. line is seen to be single and regularly interspaceally scalloped and accented on the nervules. The stigmata contrast by their grey color; the orbicular well sized, spherical; the reniform

proportionate and enclosing a blackish inferior stain as in allied genera. The subterminal line is quite distinct, being indicated by a line of powdery greyish scales, like the stigmata. There is an extremely fine grey, wavy terminal line *before* the margin, formed by the outer edging of the deeper tinted marginal line which appears as interspaceal points. Fringes light brown, cut by a fine darker hair line (preceded by a pale line) without the middle. Hind wings pale, much soiled with fuscous and with the pale fringes ruddy tinted. Beneath fuscous, with a rufous tinge, both wings rather dark, with discal marks and a broad, vague, common shade line. Thorax like fore wings ; collar above with indistinct pale edging ; palpal tips pale, as is the front, else the head is rufous. *Expanse*, 32 m. m. St. Catharines.

Besides the foregoing, Mr. Geo. Norman has secured specimens, in beautiful condition, of the following Noctuæ, on Catkins, in May :

Lithophane vulgaris, G. & R. (*socia* of my List) ; *Lith. disposita*, Morr. ; *Lith. Bethunei*, G. & R.; *Lith. ferrealis*, Grote (allied to the European *L. semi-brunnea*, Haw) ; *Lith. laticinerea*, Grote. ; *Morrisonia vomerina*, Grote ; *Actinotia ramosula* (Guen.,) and *Taeniocampa alia* Guen. These species are mostly additions to the Canadian lists. It is improbable that *Taeniocampa instabilis* occurs in N. Am.; and *T. alia* has probably been mistaken for it.

The following species of European Noctuæ are credited to North America with apparent certainty :

Agrotis augur (Fabr.)
" *baja* (W. V.)
" *c-nigrum* (Linn.)
" *plecta* (Linn.)
" *fennica* (Tausch.)
" *conflua* (Treits.)
" *saucia*, Hubn.
" *segetum* (S. V.)
" *suffusa* (S. V.)
Mamestra grandis (Boisd.)
" *brassicæ* (Linn.)
Hadena arctica, Boisd.
" *rurea* (Fabr.)
Dipterygia pinastri (Linn.)
Euplexia lucipara (Linn.)

Heliophila pallens (Linn.)
Pyrophila tragopoginis (Linn.)
Xanthia gilvago (W. V.)
Scoliopteryx libatrix (Linn.)
Plusia gamma (Linn.)
" *ni*, Hubn.
Anarta cordigera (Thunb.)
" *melanopa* (Thunb.)
Heliothis armigera, Hubn.
Euclidia cuspidea (Hubn.)

Besides the foregoing, other species are occasionally attributed to North America, such as *Hyppa rectilinea*, for which *H. xylinoides* is mistaken ; *Agrotis nigricans*, for which *Agr. tessellata* is mistaken, etc. With the exception of the boreal species of *Anarta*, the foregoing list embraces all the European species I feel as yet at all sure are properly credited to North America.

ANNUAL MEETING OF THE MONTREAL BRANCH.

The first annual meeting of the Montreal Branch of the Entomological Society of Ontario was held on May 6th, 1874, when the following officers were elected for the ensuing year :

W. Couper, President; G. J. Bowles, Vice-President ; F. B. Caulfield, Secretary-Treasurer ; G. B. Pearson, Curator ; Council—W. Hibbins, sen., C. W. Pearson, P. Knetzing.

The reports of the Council and Secretary-Treasurer were read, and on motion adopted. The Branch, although young, is in a prosperous condition, the expenses of the past year having been met, leaving a small balance on hand, and the list of members is gradually increasing. Owing to the lateness of the season but little field work has been done, but some rare captures have been made already. The Branch meets as usual at the residence of the President, No. 67, Bonaventure Street, Montreal, P. Q. All business communications to be addressed to the Secretary-Treasurer, F. B. Caulfield, 254, St. Martin Street, Montreal, P. Q.

CORRESPONDENCE.

A THIRSTY SPIDER.

DEAR SIR,—

On the sixth of April my attention was drawn to a small black spider running on the inside of my window-sill. In the course of its travels it came to a drop of water that had trickled from the window pane, when it stopped and commenced drinking.

Wishing to see what it would do, I touched it with my finger, when it set off at a great rate; passing near another drop, it ran to it and again commenced drinking, this time turning out of its path in its eagerness to reach the water.

I have sometimes seen Lepidopterous larvæ drinking, but had never observed a spider doing so before.

F. B. CAULFIELD, Montreal, P. Q.

DYSAUXES MEDIASTINA.

DEAR SIR,—

Dysauxes mediastina, Hubner, Zutrage, figs. 505, 506, must be erased from the list of American Lepidoptera, the locality assigned to it by Hubner being erroneous. The figures quoted above are excellent representations of an Australian insect which I have received from New South Wales. This is not the only erroneous locality which has crept into Hubner's writings, as those who have studied the volumes will have discovered.

Yours truly,

R. H. STRETCH, San Francisco.

PLATYSAMIA COLUMBIA, *S. I. Smith.*

DEAR SIR,—

In March last I found a cocoon on a maple tree, in the east end of this city, which bore a very close resemblance to *P. cecropia*, only it was not much more than half the size. I compared it with Mr. Bowles' description of *columbia*, and as it differed in some respects, I supposed it to be *cecropia*. All doubts were, however, removed by the appearance of the imago on the 13th May, which proved to be a fine male specimen of *columbia*. I believe this is the first that has been taken in Montreal.

C. W. PEARSON, Montreal, P. Q.

EDITORIAL SUMMARY.

We have received from our esteemed friend, J. A. Lintner, of Albany, N. Y., No. 3 of his Entomological Contributions, from the 26th Annual Report of the New York State Museum of Natural History, 8vo., 76 pp., with many cuts. These yearly contributions are valuable additions to our Entomological literature, giving us in terse language the facts and observations recorded by one of our most accurate and pains-taking fellow laborers. The present No. is divided into 12 chapters, in each of which much will be found to interest the practical Entomologist. The first is on the larva of *Eudryas unio* and allied forms. Then follow—"Transformations of some Bombycidae," "Descriptions of Larvae of some Bombycidae and Noctuidae," "Notes on New York Bombycidae and Noctuidae," "Descriptions of New Species of Cucullia," &c., &c. We trust Mr. Lintner will receive every encouragement from the directors of the New York State Museum in the prosecution of his valued labors.

The promised list of the Noctuidae of North America, by Aug. R. Grote, has come to hand. It is a goodly octavo pamphlet of 77 pages, with one colored plate illustrating eleven new species. The first 58 pages are occupied with the catalogue proper, which is conveniently indexed and gives evidence throughout of great care and labor in its compilation; the remaining pages are filled with descriptions of some 35 species, many of which are new. As stated in our last, this list will appear in the forthcoming number of the *Bulletin of the Buffalo Society of Natural Sciences*. For the convenience of Entomologists, separate copies have been struck off, which may be had by remitting $1.50 to the Secretary, L. F. Harvey, M. D.

Psyche.—The first number of this little Entomological monthly has appeared. It is nicely printed on good paper, and we doubt not, from the array of names of noted Entomologists composing the Cambridge Entomological Club, of which this is to be the organ, that it will be well sustained.

The Butterflies of North America, by W. H. Edwards.—Part 1 of the second series is just at hand, with five beautifully colored plates, in which the drawing and coloring are both elegant and faithful. We know of no illustrations so charming and correct as these are. If all the succeeding parts of the forthcoming volume equal in design and execution that which we are now noticing, vol. 2 will be a fitting sequel to vol. 1. Figures of the larva and egg in several instances accompany those of the perfect insect.

The Canadian Entomologist.

VOL. VI. LONDON, ONT., JULY, 1874. No. 7

NOTES ON THE LARVÆ OF ARGYNNIS CYBELE, APHRODITE AND DIANA.

BY W. H. EDWARDS, COALBURGH, W. VA.

I am now able to give the results of my attempts at raising the caterpillars of the three Argynnides, *Cybele*, *Aphrodite* and *Diana*, from the egg, this past season. In August and early in September, 1873, females of *cybele* were easily obtained, and a few of *aphrodite*, which is a rare species here, and these were shut up in kegs, within which were placed pots of growing violets. The eggs were laid abundantly on the leaves and stems, and on the cloths which covered the kegs. There were soon several hundreds of *cybele* eggs, and many of *aphrodite*. About the same time, Mr. T. L. Mead, who was at Coalburgh, made an excursion to a region about fifty miles east of us, where *diana* had been previously found by him in some numbers, and brought back with him about sixty females, which were placed in kegs and boxes, also with violets either in pots or planted in earth in the boxes. Hundreds of eggs were so obtained of this species. The three species hatched in from seven to twelve days, and so far as was possible, the larvae at large were transferred to plants, but of course many were lost. In a few instances some of them were observed to feed on the leaves, but almost all began their hybernation at once after hatching, and fixed themselves on the under sides of the leaves, and especially in the grooves of the leaf-stems, where some of them were to be seen, extending quite down to the base of the stem. The three species were so nearly alike at this stage that *cybele* and *aphrodite* could not be distinguished apart by any glass I had, and *diana* differed almost imperceptibly from the others.

They were each about one-twentieth of an inch long, cylindrical, with brown heads ; the body greenish brown, with rows of tuberculated darker colored spots, from each of which emanated a black hair.

As the weather became cool the plants gradually lost their leaves by drying up; mould began to attack the decaying leaves, and I was compelled to transfer the caterpillars to fresh plants, which at this season I had much trouble in providing. In fact I had to raise a number of plants from off-shoots in the house, to be ready for any emergency. The transfer was effected by using a pin bent at the point. The larvae would curl up when touched, and were easily hooked and so moved. When placed on the new plants they would soon straighten out, and change position sufficiently to make themselves comfortable. But as the process had to be repeated several times as the winter progressed, a great many of the larvae were lost. I placed the pots in a small greenhouse about the 1st of January, hoping to see the caterpillars revive and commence feeding, and had the satisfaction soon after of seeing this desired result take place. On the 9th of January I noticed some of the *cybele* were active and had been feeding; on the 21st, *aphrodite* and *diana*. They very soon began to increase in size perceptibly, and were active in running about the leaves and in wandering off the flower pots. I should have lost these lively ones had I not confined them to the plants by glass lamp chimneys and glass globes. But in these the air was no doubt too confined for an *Argynnis* caterpillar (though a *Grapta* would have thrived,) for many died; and I came near losing them all in a way that I had not provided for, the gardener having taken occasion one day, when I was absent from home, to smoke the entire house with tobacco, forgetting to remove my pots.

From this catastrophe emerged about a score of *cybele*, half a dozen *aphrodite*, and a few of *diana*. These larvae all throughout this period grew very slowly, no doubt owing to the cooling down of the house at nights, so that it was the 27th of January before I was able to see that any had passed the first moult. The first to change was *cybele*, which now appeared in a coat of smoky brown, covered with long fleshy spines, from which sprung many short black bristles. These spines were of the general appearance shown in the several successive moults. In all there were five moults to each of these species, and until the fourth they maintained their close resemblance to one another, so that had one from either lot escaped to another, I could not have separated them. They were cylindrical, thick, furnished with six rows of stout black spines, from the ends and sides of which sprung stiff bristles. The color of the body was silky brown or black, and at bases of part of the spines were yellow or fulvous spots. The heads were bilobed, brown or black, much tubercled,

with conical vertices, and the back of the head was yellow or fulvous; the spines of the second segment were rather longer than the rest and projected forward horizontally over the head. After the fourth moult there were some differences. *Cybele* became larger than *aphrodite*, though not varying much in other respects, the one measuring at maturity about two inches in length, and the other about one and a half inches. But *diana*, which was also large, like *cybele*, at the fourth moult, displayed spines of immense size, nearly twice the length of those of the other two species. These radiated from the central axis of the body, like spokes from the hub of a wheel, the lower lateral row drooping so that the ends were on the level of the feet. The spines of the second segment, four in all, two dorsal and two lateral, were a formidable protection to the head. It was a superb creature.

The mortality had been so great among all these larvae that at last, as they approached maturity, they were reduced to but three or four of *cybele*, two of *aphrodite*, and one of *diana*, and how to preserve these was a matter of much anxiety. I arranged a keg with a high gauze bag over the top of it, which bag was confined by the upper hoop, and in the keg were planted violets every two or three days, as the leaves were consumed. This plan seemed to answer well, affording plenty of air, and I regretted that I had not tried it sooner. The larvae were fond of resting high up the sides of the bag, or on elevated sticks under it, coming down when impelled by hunger. After remaining motionless for hours, they would suddenly arouse themselves and start off in extreme haste, wandering all round the enclosure, and when leaves were reached, would eat ravenously and then climb up to rest again. I sometimes found them extended on the earth, and no doubt they appreciated the coolness and dampness of it.

Only three *cybele* went into chrysalis. They spun buttons of white silk and soon hung suspended, nearly straight, the anterior segments but little bent, and so continued about two days, when the change to chrysalis occurred. The first change was on the 19th of May, and three months and ten days from the awaking from hybernation. The chrysalis yielded the imago in twenty-three or twenty-four days, and the whole period from the laying of the egg to the imago was just thirty-eight weeks. One *aphrodite* only fastened for chrysalis. This was on the 14th of May, and the change occurred on the 15th, an interval of about thirty-six hours Unfortunately this insect died in chrysalis.

Diana fixed on the 17th, and became a chrysalis on the 19th, the interval being about fifty-four hours. This yielded a butterfly on the 9th of June, after twenty to twenty-one days. The chrysalids of the three bore a strong likeness to each other, being all of the same general shape, and I may say in brief that they would be tolerably represented by the figure of the chrysalis of *A. aglaia*, in Humphrey's British Butterflies, although much larger than that figure. The length of *cybele* and *diana* was rather over one inch; *aphrodite* was as long, but more slender than the others, and it, as well as *diana*, was prettily streaked and variegated in brown and red; *cybele* was plain brown, and in one case yellow brown, with little ornamentation. By Miss Peart's assistance I was able to obtain a complete series of drawings from egg to chrysalis of each species, and of the several moults of each, and I propose to introduce these figures in course of Vol. 2, Butterflies of N. A.

Cybele was flying this year at Coalburgh, on the 1st of June, and these early examples must have come from larvae that began to feed after hybernation in March, as the food plant then would first appear above ground, so that the larval period after hybernation, when in the natural state, would be two months shorter than in the cases related above.

With regard to the food plant, I used every species of wild violet accessible from the woods, and during the winter cultivated species, and discovered no preference for one more than another. The wild violets were in flower part of the time, and the flowers were eaten by the caterpillars with avidity. The contrast between the habits of these larvae and those of other genera not far separated from them, according to the received arrangement, is something remarkable—as *Grapta*, for instance. One is in the preparatory stages nine months in the year, is impatient of confinement, extremely tender and raised only by the greatest care; the other is hardy, indifferent to confinement, and completes its cycle in about thirty days, from the laying of the egg to the appearance of the butterfly; one is single brooded, the other many brooded, at Coalburgh there being three or four. The number is probably dependant in any latitude upon the length of the season.

There are one or two points in the life history of the larger Argynnides that are not yet clear. With us, *cybele* ♂ is on the wing from the 25th of May to the 10th of June, as I have noticed for several successive years. Probably *aphrodite* nearly as soon, and *diana* first appears about the 20th of June. Shortly after the 1st of June the ♀ of

cybele is to be seen, and both sexes abound in the clover fields. By the end of June *cybele* has become scarce, and the individuals to be seen have lost their freshness and are broken and worn. It is certain that these early appearing females have not matured eggs and laid them, because at no time from June to August will anything but rudimentary eggs be found by dissecting, and the eggs do not become distinguishable to the eye until August. They then mature rapidly, and in a few days attain full size. I am confident that no eggs are laid till August. But about the first of that month and all along to near the end of it, there appear in great numbers both fresh males and females, as if just from chrysalis, with no abrasion of the hairs on thorax between the wings, which spot is the first to show wear. (I doubt if an *Argynnis* could fly two days without thus giving evidence of it.) There are flying at the same time many worn individuals, especially females. These last are the first to deposit their eggs, but shortly after, and up to the time of frosts, the others also are in condition to do the same. I see no explanation of the appearance of these freshly emerged butterflies than that they have formed part of the brood of caterpillars hatched the previous fall, some of which brood yielded the butterflies that came out in May and June, and the remainder continued in the larval or chrysalis state until August, and upon these last the perpetuation of the species largely depends, for nine-tenths of the June flight must have been destroyed long before August. If I am right, the preparatory stages of the August *cybele* must consume eleven months out of the twelve.

CATOCALA WHITNEYI, *N. sp.*

BY G. M. DODGE, GLENCOE, DODGE CO., NEBRASKA.

Expands 1 ⅝ inches. Primaries light gray, the outer third brownish, with a triangular gray spot near the apex. A narrow black line near the base of the wing extends from the costa to the submedian vein. Parallel to this and farther out, a black patch, narrowest at the costa and broadest on the second median veinlet, extends nearly across the wing, ending at the submedian vein. A triangular black patch surrounds the brownish reniform spot, and immediately back of this a curved black line reaches from the sub-dorsal vein to the second median veinlet. The secondaries

are yellow. The black median band is curved, constricted in the middle and ends abruptly at the submedian vein. The marginal band is broadest at the apex, is sometimes broken opposite the termination of the median band, and extends but little beyond the submedian vein. There is a small yellow apical spot. Fringe on fore wings brown; on hind wings whitish, partly brown at base.

Beneath the prevailing color is yellow, being lighter outwardly. The median band of the posteriors is narrower than above, and prolonged by scattered black scales toward the anal angle. The marginal band is unbroken. Lunule black. Thorax and collar light gray. About one-third or less of the specimens taken are brown instead of gray. The median band also varies in width.

I name this species in honor of Mr. C. P. Whitney, of Milford, New Hampshire. My specimens were taken at Ohio, Ill., but it also occurs here. It is the only Catocala that I have ever seen attracted by flowers.

THE FOOD-PLANTS OF EUROPEAN BUTTERFLIES.

Second Notice.

BY SAMUEL H. SCUDDER, CAMBRIDGE, MASS.

The third and concluding part of Kaltenbach's work *(Die Pflanzenfeinde aus der Classe der Insecten)*, has just been received in this country, and contains the following notices of the food plants of European butterflies, in addition to those previously given.* The numbers in parentheses refer to the former list.

1. *Melanargia galathea*—Phleum pratense.
2. *Erebia medusa*—Panicum, Setaria.
3. " *æthiops*—Dactylis.
4. " *ligea*—Milium effusum.
5. *Satyrus hermione*—Holcus lanatus.

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* See CANADIAN ENTOMOLOGIST, vi, 21-25.

6. *Satyrus circe*—Lolium, Bromus, Anthoxanthum.
7. " *briseis*—Sesleria and other grasses.
8. " *semele*—Several species of Aira.
9. " *dryas*—Avena elatior.
10. *Pararge mæra*—Poa annua, Glyceria fluitans, Hordeum murinum, Festuca.
11. " *megæra*—Triticum and other grasses.
12. " *ægeria*—Triticum repens.
13. " *achine*—Lolium teriueleutum, Carex.
14. *Epinephele janira*—Poa annua and other grasses.
15. " *ida*—Triticum cespitosum.
16. " *tithonus*—Poa annua.
17. " *hyperantus*—Milium effusum, Poa annua, P. pratensis.
18. *Coenonympha hero*—Elymus Europæus and other grasses.
19. " *iphis*—Brachypodium sylvaticum, Cynosurus and other grasses.
20. " *arcania*—Melica nutans.
21. " *corvinna*—Triticum cespitosum, Carex gynomane.
22. " *pamphilus*—Poa, Anthoxanthum.
23. " *tiphon*—Festuca elatior.
24. (12). *Vanessa L. album*—Hippophae rhamnoides, Gooseberry, Birch, Purple willow.
25. (15). " *antiopa*—Salix capræa.
26. (32). *Melitæa maturna*—Fagus sylvatica, Scabiosa.
27. (34). " *cinxia*—Aira canescens.
28. (46). *Thecla W. album*—Prunus spinosa.
29. (47). " *ilicis*—Quercus.
30. " *quercus*—Quercus.
31. (59). *Lycæna icarus*—Medicago minima.
32. (67). " *semiargus*—Anthyllis vulneraria.
33. (86). *Pieris daplidice*—Diplotaxis tenuifolia.
34. (87). *Aporia cratægi*—Quercus.
35. *Thais polyxena*—Quercus ilex.
36. (97). *Syrichtus malvæ*—Fragraria vesca, Agrimonia eupatoria.
37. *Hesperia thaumas*—Aira montana, Festuca, Phleum.
38. " *lineola*—Arrhenatherum avenacium.
39. (100). *Hesperia sylvanus*—Avena pratensis, Holcus lanatus, Festuca.

MICRO-LEPIDOPTERA.

BY V. T. CHAMBERS, COVINGTON, KENTUCKY.

(Continued from page 97.)

COLEOPHORA.

[Antennae and palpi both simple.]

C. zelleriella. N. sp.

Slate color, tinged with ochreous; apex of the abdomen yellowish; two longitudinal dusky lines on top of the abdomen, which, however, are invisible in the dead specimen. *Al. ex.* $\frac{6}{16}$ inch. Kentucky.

The case is ochreous, slender, cylindrical, tapering a little to each end, and compressed or pinched at the posterior end, so as to divide it into three small ridges. It is about half an inch long, and was found adhering to the bark of sugar trees *(Acer saccharinum.)*

C. argenti-albella. N. sp.

Silvery white; some parts of the legs and under surface tinged with yellowish. *Al. ex.* $\frac{6}{16}$ inch. Kentucky. Larva and food plant unknown. The long, slender case was found adhering to the bark of beech trees *(Fagus Americana).*

C. gigantella. N. sp.

White, with seven longitudinal streaks upon the primaries, golden or ochreous yellow according to the light; one extends from the base just within the costal margin to the beginning of the ciliae. Two other parallel and oblique ones from the base near the costa to the dorsal margin near the apex; these are in the apical part of the wing, between the costal one and the first oblique one, and the seventh is within the fold, extending from the base to the dorsal ciliae.

Al. ex. $\frac{5}{8}$ inch. Collection of Mr. Wm. Saunders, London, Ont.

C. aeneusella. N. sp.

Greenish bronzy; posterior wings pale fuscous. *Al. ex.* 5 lines. Kentucky.

This species belongs to the section constituting Stephens' genus *Metallosetia.*

[Antennae simple, second joint of palpi tufted at the apex.]

C. fagi-costicella. N. sp.

Yellowish white ; a pale ochreous yellow streak from the base along the middle of the wing to near the end of the disc, where it becomes furcate and passes on into pale ochreous yellow of the apex ; dorsal margin pale ochreous yellow, and a pale ochreous yellow streak just within the costal margin. *Al. ex.* .½ inch. Kentucky. The streaks are all obsolete or nearly so.

The larva and food plant are unknown, and I am perhaps wrong in naming the species for the *habitat* in which I have always found the pupa. I have found it so invariably upon the bark of beech trees as to make me suspect that the larva feeds on beech leaves, or on the moss and lichens which grow upon the bark. The larva case is almost cylindrical, tapering a little to each end, with a bent neck or tube at the anterior end, and compressed or pinched together at the other end, so as to be deeply concave on the upper surface ; about the middle or just behind it its outer envelope is scalloped or serated so as to present three or four deep seratures or processes, looking as if the inside case had been inserted into the small bracts of a young leaf bud, from which the bud had first been removed.

C. unicolorella. N. sp.

Entire insect grayish drab, unicolorous. *Al. ex.* ⅝ inch. Kentucky. Larva and food plant unknown.

This can not be *C. concolorella* Clem., which is yellowish ochreous without markings.

C. ciliæochrella. N. sp.

Silvery white, becoming gradually tinged with reddish ochreous to the apex of the primaries, the ciliae of which are distinctly reddish ochreous ; antennae alternately annulate with white and brownish yellow. *Al. ex.* 5 lines. The tuft on the palpal joint is very small.

[Basal joint of the antennae with a small tuft ; palpi simple.]

C. rufo-luteel'a. N. sp.

Head white ; lower portion of the face tinged with yellowish ; a spot on the vertex, and tuft of the basal joint of the antennae yellow ; antennæ white, each joint annulate at its base with yellowish brown, and a few joints at the base entirely of that hue ; thorax and anterior wings deep

reddish orange, deeper, almost brown towards the apex; sides of the thorax and costal margin to the ciliæ white. *Al. ex.* nearly ½ inch. Kentucky. Captured in June.

[Basal half of the antennæ thickened with scales; palpi simple.]

C. auropurpuriella. N. sp.

Entire insect, according to the light, golden brown or golden purple with a greenish bronzy hue, especially towards the apex of the primaries, where the greenish tinge is very decided; apical half of the antennae annulate with silvery white. *Al. ex.* ⅝ inch. Coll. Mr. Wm. Saunders, London, Ont. (Belongs to *Metallosetia*, Steph.)

[Basal joint of the antennae thickened with scales; palpi tufted.]

C. lineapulvella. N. sp.

White, faintly tinged with ochreous yellow; dorsal margin and apex of the primaries more distinctly yellowish; two rather indistinct ochreous yellow lines begin before the middle of the wing and pass back, one to the apex and one to the dorsal margin before the apex, the apical line giving off a faint branch to the costal margin. Ciliae pale ochreous; the entire wing, except near the base, dusted with dark brown specks, which are arranged in lines more or less parallel to each other; antennae annulate with ochreous yellow. *Al. ex.* 5 lines. Kentucky. Taken at the lamp.

I have taken on the wing many other species, but I refrain from describing them until their food plants are known, a plan which I had perhaps also better have adopted with some of the above, for many of the species of this genus resemble each other so closely that it is well nigh impossible to give written descriptions by which they can be identified.

Signs Used to Denote Sex.—I have often been puzzled to account for the origin of the signs in use among naturalists to denote the male (♂) and the female (♀) sexes; but the other day, while reading an astronomical paper, I came across a fact which seems to offer a solution of the difficulty. It appears that the first sign (♂) has been used from remote antiquity to signify the planet Mars, and is a rude representation of a spear behind a shield, fit emblems of the God of War. Ceres, the goddess of corn, was similarly symbolized by the sign used in zoology to denote the female sex, with this slight difference, that in the original astronomical sign, the continuity of the circle is broken on the left side, so that the figure appropriately represents a sickle.—*E. C. Lefroy in Hardwicke's Science Gossip.*

ON TWO SPECIES OF AGROTIS, ALLIED TO A. TRIANGULUM.

BY AUG. R. GROTE,

Curator of Articulata, Buffalo Soc. of Natural Sciences.

Among the material submitted to me for determination by Professor Packard, from the Peabody Academy of Science, are specimens from Maine and Massachusetts of two species of *Agrotis* allied to, but distinct from *A. triangulum.*

Agrotis attentus. N. sp.

The eyes are naked. The middle and hind tibiae are armed, but the fore tibiae are without spines; male antennae simple, bristled and pubescent. Fore wings pulverulent brown, paler over the costal region, on which the inception of the geminate lines are marked in dark brown. There is a narrow deep brown basal ray extending to the dentate indistinct t. a. line. Disc not suffused with darker brown between the ordinary spots, which are moderate, pale, with fine dark annuli. Orbicular *spherical*, complete, not pointed inferiorly, as in *triangulum.* T. p. line with its pale centre alone perceivable, denticulated, notched opposite the cell. The subterminal space is not differentiated by any darker tint; the subterminal line is pale, preceded at costa by a very slightly darker brown shade, not always noticeable, and not at all like the determinate mark of *triangulum.* Male hind wings almost whitish; female darker. Thorax and head like fore wings. Beneath the fore wings are brown, with the exterior line indicated; hind wings with brown costal region, else pale, with faint discal spot and a double subterminal line marked on the costal region. Maine; two specimens; expanse, 36 m. m.

Agrotis perattentus. N. sp.

Eyes naked; fore tibiae unarmed, middle and hind tibiae spinose; male antennae simple, bristled and pubescent. Color of *A. attentus*, but brighter, rosy brown and more like *triangulum*, on account of the discal field before the orbicular and between the spots being suffused with dark brown shading. Orbicular spherical, pale; claviform indicated in outline; a deep brown shading accompanies the basal dash. Reniform large and wider than in *triangulum.* Ordinary lines distinct, geminate, dark brown; t. p. line with its inner line distinct, lunulate; its outer line lost

against the darker brown subterminal space, which is differentiated by its deeper color and which it inwardly limits. Subterminal line indicated by the difference in color between the subterminal and terminal spaces, the latter concolorous with the rest of the wing. Hind wings pale testaceous fuscous in ♂, more fuscous in ♀. Beneath a common fuscous line and dots; the tint is testaceous, with fuscous powdering; fore wings the darker, with ruddy costal edge. Mass.; Me.; expanse, 32 to 36 m. m.

Both these species are slighter bodied than the European *A. triangulum*, and differ in ornamentation by the shape of the ordinary spots, the conformation of the t. p. line, and the pallor of the hind wings.

Mamestra renigera (Steph.)

This species, referred in my "List" to *Hadena* (p. 16), belongs to *Mamestra*, and should be interpolated on page 13 l. c., between *M cinnabarina* and *M. laudabilis*.

NOTES ON THE LARVA OF LEUCANIA PSEUDARGYRIA, Guenee.

BY F. B. CAULFIELD, MONTREAL, P. Q.

On April 18th of this season, while searching for insects on Montreal Mountain, I found under a stone at the foot of a hickory tree, a larva, of which the following is a description:

Length two inches. Form cylindrical, slightly annulated. Head reddish yellow, with two brown streaks, and marbled with lines and dots of the same color; semi-transparent, shiny, slightly bilobed, with a few scattered hairs of a whitish brown color. Mandibles brown.

Body above dirty greenish grey, with darker spots and blotches, a faint white dorsal line, and another of the same color a little above the spiracles; sides light greenish grey, minutely spotted with brown, with a few scattered hairs of a brown color, tipped with yellowish white. Under-surface, feet and prolegs very light greenish grey.

I placed this larva in a box with some earth, but owing to the backwardness of the season I could not find any food for it. It went under the earth on April 21st, and turned to a chrysalis on April 23rd. The imago emerged on May 20th, and proved to be *Leucania pseudargyria*, Guen.

That this larva hybernated there can be no doubt, and I believe, as a rule, that those larvæ which lie dormant during the winter, when spring

comes, feed again for a short time before changing to chrysalis, but this instance proves that food is not always necessary to them after they have hybernated, as there was not even a bud to be seen when I found it. Of course under its natural conditions it would have partaken of some food as soon as vegetation appeared, otherwise it would have pupated in the autumn. This deviation from the usual habit may be attributed to its changed conditions, the warmth of the house hastening its transformations.

FIRST ANNUAL REPORT OF THE COUNCIL OF THE MONTREAL BRANCH OF THE ENTOMOLOGICAL SOCIETY OF ONTARIO.

During the summer of 1873 a fortunate circumstance occurred to which this Branch owes its origin. The following gentlemen, viz., Wm. Couper, F. B. Caulfield, Wm. Hibbins, C. W. Pearson and G. B. Pearson, met by chance on the Montreal Mountain, where the subject was discussed, and it was then decided to hold a meeting at the residence of Mr. Caulfield, in order to make further arrangements for its formation. This meeting was held on the 30th of August, when it was resolved to form a branch in connection with the Entomological Society of Ontario, and the Secretary *pro. tem.* was instructed to write to the parent society, asking permission to form a Branch Society in this city. This proposition was at once accepted by the parent Society.

On the 16th of October the following officers were elected for the ensuing year :—William Couper, President ; M. Kollmar, Vice-President ; F. B. Caulfield, Secretary-Treasurer ; Council—G. J. Bowles, P. Knetzing and C. W. Pearson ; Curator, William Hibbins.

By-Laws were framed for the guidance of the Branch, which were approved by the parent Society. Our monthly meetings have been regularly held and well attended, and your Council congratulate the Society on the benefits derived. During the eight meetings which have been held, independent of the production of original communications on Entomology, there were remarkably good exhibitions of insects, which also tended to give additional information to members.

The first meeting of the Branch in August, 1873, consisted of seven members, and since then five additional members have been elected.

The following papers were read during the winter months :

"A Dissertation on Northern Butterflies," by William Couper; "On the Cicindelidae Occurring on the Island of Montreal," by F. B. Caulfield; "On Some of the Benefits Derived from Insects," by F. B. Caulfield.

The following works have been donated during the year :

"On Some Remarkable Forms of Animal Life from the Great Deeps of the Norwegian Coast," by G. O. Sars, 1 vol.; "On Norwegian Crustaceans," by G. O. Sars, 2 vols.; "Synopsis of the Acrididae of North America," by Cyrus Thomas, 1 vol.

Your Council would suggest that the Curator procure store boxes for the preservation of the specimens obtained for the Society during the approaching season. In this way the nucleus of a collection can be formed prior to the purchase of a cabinet, which your Council trusts the Society will be possessed of before next winter.

Your Council would also suggest that members carry note-books wherein to record Entomological observations, especially relative to insects injurious to the crops; also of such species as are considered beneficial in checking the progress of destructive insects. As this is one of the principal objects of the Society, field notes of this nature are always valuable, and should form subjects of investigation and discussion at our meetings. Attention should be given to the larval forms of insects, as this is a specialty of Entomology from which much knowledge is yet to be obtained.

Your Council strongly impress on the members to use their influence in promoting a knowledge of the importance of the study of Entomology, more especially with agriculturists and horticulturists, in order to enable them to check the ravages of the numerous insects injurious to vegetation.

All of which is respectfully submitted.

WM. COUPER,
Chairman.

C. W. PEARSON,
GEO. JNO. BOWLES.

NOTES ON THE SPECIES OF OODII OF LOUISIANA.

BY S. V. SUMMERS, M. D., NEW ORLEANS, LA.

The species belonging to this sub-tribe, although small in number, rank with the rarer forms of Carabidæ ; they may easily he known by their glabrous body and the confluent eighth and ninth striæ of the elytra. Several of the Oodii bear a superficial resemblance to certain *Amara* allied to *fallax*. With one exception *(O. elegans)* the species are all Atlantic, occurring more abundantly southward. *Oodes fluvialis* must be considered a typical northern species, occurring rarely near St. Louis, Mo., but more abundant at Rock Island, Ill. *O. elegans* has occurred with Dr. Le Conte along the Gila River, in Arizona. We may expect additional species from the Southern Pacific region and the western source of the Rio Grande.

Lachnocrepis parallelus (Say).

A single ♂ specimen taken in November, under a partially submerged log on the Jackson R. R., near New Orleans. Dr. Horn gives the length 0.42 inch (Trans. Am. Ent. Soc., v. 3, p. 106) ; my specimen measures 0.44 inch long. Color black, somewhat shiny ; basal angles of thorax reddish brown. I have not been able to find this species in any of the New Orleans collections. I have seen one in Mr. Trabrandt's cabinet, from Mexico, near the Rio Grande.

Anatrichis minuta (Dej.)

Our smallest Oodii ; length, 0.20--0.25 inch. Rather rare. Specimens taken adhering to under surface of logs near streams, and on sifting mud from roots of plants over water. This species seems not to have occurred in Louisiana collections before last winter.

Oodes amaroides (Dej.)

Length, 0.34-0.40 inch. More than twenty specimens taken in galleries under logs, in very damp or muddy places. The species of the sub-genus *Oodes* (Chaudoir), have the ability to remain under water for nearly an hour at a time, and are seldom found running on the ground.

Oodes Americanus (Dej.)

Length, 0.58 inch. A single ♂ taken under a rail on the Ponchartrain R. R. Several others occur with Mr. Trabrandt. Our largest and rarest

species; none of my *fluvialis* measure over 0.52 inch. Dr. Horn gives this and the preceding species as 0.50 inch long *(ante.)*

Oodes cuprœus (Chaud.)

Several specimens taken by Mr. Trabrandt. I have found this species pretty common near St. Louis, Mo., on baling water over mud flats. They take flight very readily, and may be found running on the ground on warm days, but I have never been able to find them or *Lecontei* remain under water longer than most Carabidæ. The La. specimen before me is greatly mutilated, and I am reluctant to give its measurement. The Missouri species give 0.40 inch long.

Oodes Lecontei (Chaud.)

Length, ♂, 0.36 inch; ♀, 0.40 inch. Not rare. Many specimens taken under logs near water on bailing near the shore; also running on the ground in July and August. It is a more robust species than *cuprœus*, less shining and with punctured striæ. A single specimen taken somewhere on the coast of Miss., during the stoppage of steamer to "wood up," in June.

Oodes 14-striatus (Chaud.)

Length, 0.42--0.47 inch. Common everywhere near N. O. during the summer; found under logs and running on the ground near water, and frequently under loose bark in the woods. The specimens have a decidedly greenish tinge when alive. They are not as active as the Oodes and Stenous groups. Mr. Trabrandt informs me that they do not occur abundantly every year. They are also found in Texas and Mexico.

Oodes texanus, Lec.

Length, 0.42 inch—♂. A single specimen taken by C. Trabrandt while collecting together, and given me as a *14-striatus*, from which it is at once distinguished by the punctured striæ. The specimen occurred under some rail-road ties on the Ponchartrain R. R., on high ground, not near water. Dilligent search has sinced failed to discover others.

Evolenes impressus, Lec.

Length, 0.37 inch—♀. A single specimen taken near New Orleans and given me by Mr. Em. Trochammur. This is the rarest Oodii occurring in La. Any enlargement on descriptions of species would seem out of place, but would refer all to Dr. Horn's admirable and complete synopsis in Trans. Am. Ent. Soc., Vol. 3, No. 2, 1870.

Crinus scrophulariæ, Auct.

A unique of this European Curculio was taken on wood wharf, June 30th. There can be little doubt of the correctness of this determination. My specimen is 0.16 inch long (exclusive of rostrum). Body black. Rostrum shorter than thorax, slightly arcuate; antennæ inserted about two thirds from tip, piceous; club somewhat paler. Thorax much narrower than base of elytra, covered with dense prostrate yellowish hairs, and with an elevated transverse ridge at middle; elytra somewhat triangular, blackish, coarsely punctured and with four black longitudinal vittæ, dotted with whitish. A rather large, oblong, dense black spot, margined posteriorly with whitish hairs, placed on the suture, near the scutellum, and a similar but smaller spot at apex. Legs blackish, more or less speckled with whitish hairs.

ANTICOSTI COLEOPTERA.

COLLECTED ON THE ISLAND IN 1873, BY WM. COUPER, MONTREAL.

(As determined by J. L. Leconte, M. D.)

Notiophilus sibiricus, *Motsch.*
Carabus palustris, *Fischer.*
" lapilayi, *Laporte.*
Calathus ingratus, *Dej.*
" confusus, *Lec.*
Pterostichus coracinus, *Lec.*
" luczotii, *Lec.*
Harpalus pleuriticus, *Kirby.*
Boletobius pygmaeus, *Mann.*
Creophilus villosus, *Kirby.*
Anthobium dimidiatum, *Mels.*
Necrophorus vespilloides, *Herbst.*
" mortuorum (pygmaeus), *Kirby.*
Hydnobius substriatus, *Lec.*
Epuraea boreella, *Er.*
Omosita colon, *Er.*
Byrrhus americanus, *Lec.*
Heterocerus substriatus, *Kies.*
Aphodius fimetarius, *Ill.*
" ruricola, *Mels.*
" granarius,var. spretus, *Hald.*
Chrysobothris trinervia, *Lec.*
Elater mixtus, *Lec.*
Agriotes fucosus, *Lec.*
Limonius quercinus, *Dej.*
Sericosomus incongruus, *Lec.*
Corymbites resplendens, *Esch.*
" aeneicollis(Kendalli),*Kirby.*
" spinosus, *Lec.*
" aratus, *Lec.*
Eros coccinatus, *Say.*
Podabrus basillaris, *Say.*
" laevicollis, *Kirby.*
Telephorus fraxini, *Say.*
Dolichosoma foveicollis, *Kirby.*
Hadrobregmus foveatus, *Kirby.*
Spondylus upiformis, *Mann.*
Criocephalus agrestis, *Kirby.*
Pachyta monticola, *Rand.*
Acmaeops pratensis (strigilata.)
Leptura pedalis.
Donacia emarginata, *Kirby.*
Syneta tripla, *Say.*

Pachybrachis atomarius, *Mels.*
Bromius vitis, *Fabr.*
Anaspis rufa, *Say.*
Hylobius pinicola, *Couper.*
Dryocaetus septentrionis, *Hbst.*
Dendroctonus rufipennis.
Amara, not determined.
Cyphon, indeterminate.
Graptodera, not named.
Ceutorhynchus, not determined.

ON SOME OF OUR COMMON INSECTS.

17.—THE CURRANT GEOMETER OR MEASURING WORM —Ellopia (abraxis) ribearia, Fitch.

BY THE EDITOR.

This insect is now becoming very abundant in most parts of Ontario, and is a very troublesome pest. Its peculiar mode of progression will enable one to readily distinguish it from the common Saw-fly caterpillar, for, having its feet placed at each extremity, it arches its body into a sort of loop at every step, and is hence popularly called a measuring worm or span worm.

Fig. 22 (after Riley) shows this caterpillar in various attitudes. At 2 it is represented hanging from a silken thread which it has the power of spinning at will, and by means of which it is enabled to lower itself suddenly from the bush when danger threatens, and remains suspended in mid air until it can safely return to its former position. When full grown, it measures an inch or a little more in length. Its head is of a medium size, white, bilobed with a large round black spot on the upper part of each lobe, a short black stripe across the front, a little above the mouth, with a small spot of the same color on each side of it; there are also a few short black hairs scattered over its surface; jaws black. The body above is whitish, with a number of black spots of different sizes on each ring or segment; there

Fig. 22.

is a wide yellow stripe down the back, and another of the same character along each side, but somewhat broken. The under side is white, with a slight tinge of pink, and also spotted with black, with a wide yellow stripe down the middle. The feet are blackish; prolegs yellow, dotted with black.

When full grown, the larva descends to the earth and buries itself a little below the surface, where it is transformed into a dark brown chrysalis about half an inch long, and remains in this inactive state from two to three weeks.

The moth, see fig. 23 (after Riley), is of a pale yellowish color, with several dusky spots varying in size, form and distinctness in different specimens; sometimes they are so arranged as to form one or two irregular bands across the wings; when these latter are expanded they measure about 1¼ inches. Soon after the moths escape they pair and shortly the female deposits her eggs on the twigs and branches of the gooseberry and currant bushes, where it is said they remain unchanged until the following spring.

Fig. 23.

This insect is a native of America, and was formerly confined to the wild gooseberry and currant bushes, on which we still occasionally see them. The larvae are found in various stages of their growth, from the 1st to about the 20th of June, and will feed on the black currant as well as on the red and white currant and gooseberry. The moths begin to appear during the first days of July, and are very common for two or three weeks following.

Powdered hellebore mixed with water and used with a watering pot, or Paris green mixed with twenty times its weight of flour and dusted on the bushes, will be found effectual remedies for the destruction of this caterpillar. The habit it has of letting itself down from the bush with a silken thread, and remaining suspended, may also be turned to practical account in its capture, for if, after tapping the infested bushes, a forked stick or some similar instrument is passed under it, all the hanging threads may be caught and the larvae drawn out in groups and crushed with the foot.

EDITORIAL SUMMARY.

We have been kindly favored with a copy of the "Sixth Annual Report on the Noxious, Beneficial and Other Insects of the State of Missouri," by C. V. Riley, State Entomologist, 8vo., pp. 160, with 55 illustrations. Both entomologists and agriculturists are laid under lasting obligations to Mr. Riley for these excellent yearly reports on the life history and depredations of many of our insects. The present Report opens with "Notes of the Year," under which heading there are given some practical observations on the Codling Moth, the Colorado Potato Beetle and the Cotton Worm. Next follows a lengthy and exhaustive chapter of 56 pages on the Grape Phylloxera, in which is brought together in a consecutive form all the facts hitherto published in reference to this interesting insect. The Blue Caterpillars of the Vine then claim attention, each species being nicely illustrated. Detailed accounts are given also of Ham Beetles, the Clover Worm, the legged Maple Borer, the Raspberry Root Borer, the Northern Brenthian and the Jumping Sumach Beetle. A chapter on Beneficial Insects is next in order, in which the life history of a parasite on the common white grub is detailed. Then follow observations on the Dominican Case Bearer, the Yucca Moth, Hackberry Butterflies, closing with an interesting chapter on the Katydids. Mr. Riley seems admirably adapted to fill the position in which he has been placed, and we sincerely hope he may long be spared to prosecute the work he loves so well.

Interesting Captures.—Mr. F. C. Lowe, of Dunnville, has recently been on a collecting tour in the county of Essex, and we have been favored with a sight of some of his captures. Among the more interesting insects secured, we would especially mention a very handsome and perfect specimen of *Papilio marcellus*, with the ground color an unusually fine pale green. Mr. Lowe saw three of these insects on the wing in the neighborhood of North Ridge, about four miles from Essex Centre, on the Canada Southern R. R, but only succeeded in capturing one of them. *Papilio thoas*—several taken. This insect was quite common in almost every clover field in that neighborhood. Mr. Lowe took two specimens of *thoas* last season on the River St. Clair, near Port Lambton. *Thyreus nessus* also common in clover fields; *Hesp. oileus*, several specimens; also the following, all captured between the 10th and 20th June: *Erebia nephele*, common; *Eudamus tityrus*, common; *Papilio turnus* and *P. troilus; Nisoniades catullus*, not rare; *M. tharos*, common; *P. Americana*, common; *Hesp. bathyllus*, rather plentiful; *Hesp. zabulon*, very common; *Nisoniades persius*, *Trichius bidens* and *Desmocerus palliatus*.

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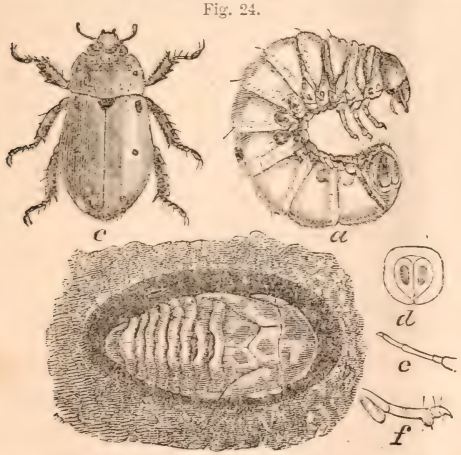
ON SOME OF OUR COMMON INSECTS.

18.—THE SPOTTED PELIDNOTA—Pelidnota punctata, Linn.

BY THE EDITOR.

This large and handsome beetle is an enemy to the grape vine. It attacks the foliage, eating numerous holes in the leaves, and sometimes when the beetles are abundant, completely riddling them. Damage from this cause to any great extent is however, fortunately of rare occurrence; in most instances the beetles are not numerous, but even where only occasionally met with, their size and beauty will always attract notice.

Fig. 24.



In the accompanying figure 24 (after Riley) this insect is shown in its three stages of larva (*a*), chrysalis (*b*), and beetle (*c*); it is in the latter state only that it is injurious to the vine.

The beetle measures about one inch in length, and half an inch in width at its widest part, is nearly oval in form and of a dull reddish yellow color, with a polished surface. The thorax, which is slightly darker than the wing covers, has a small black spot on each side, and there are three larger ones on each wing case. The jaws and posterior part of the head are both black; so also is the scutellum, which is a small, nearly triangular piece placed near the centre above, just where the two anterior edges of

the wing cases join the thorax. The transparent gauzy wings, which are concealed when not in flight under the wing cases, are dark brown. The under side of the beetle is of a dark green shade, with a metallic lustre and downy about the middle, with fine brownish hairs; legs dark shining green.

It appears with us during July and August, and is moderately active during the day time, flying about from vine to vine with a heavy awkward flight and loud buzzing noise. After pairing, the female deposits her eggs in rotten wood, on which the grub, when hatched, feeds; the decaying stumps and exposed roots of different trees are usually selected for this purpose. Mr. Riley, of St. Louis, Mo., was the first to describe this larva, and we quote his description as given in the *American Entomologist*, vol. 2, p. 295 :

"It is a large, clumsy grub, bearing a close resemblance to the common white grub of our meadows, and differs from that species principally in having the skin more polished and of a purer white color, and in the distinct heart-shaped swelling above the anus, fig. 24, *d*. Towards the latter part of June we have found this larva (fig. 24, *a*), in common with the pupa (*b*), in rotten stumps and roots of the pear. In preparing for the pupa state the larva forms a rather unsubstantial cocoon of its own excrement, mixed with the surrounding wood. The pupa state lasts but from eight to ten days, and the beetle (*c*) is found on our vines during the months of July, August and September. It is not yet known how long a time is required for the developement of the larva, but from analogy we may infer that the insect lives in that state upwards of three years."

In the figure, *e* shows the antenna of the larva, and *f* one of the legs —both magnified.

This insect in our Domtnion is confined mainly to the province of Ontario, and prevails most in the western section. We are not aware of its having been found at all in Quebec. It is common in most of the Western and Eastern States. Should it become sufficiently numerous in any section to excite alarm, it may readily be checked by hand picking; the insect being heavy and clumsy in its movements, may be easily captured and destroyed.

THE LINNEAN SIGNIFICATION OF THE GENERIC TERM PAPILIO.

BY SAMUEL H. SCUDDER, CAMBRIDGE, MASS.

Perhaps no part of my "Systematic Revision of Some of the American Butterflies" has been more severely criticized than the restoration of the Linnean name Papilio to one of the nymphalideous butterflies, Antiopa. The principal objection made to this change, besides the fact that it runs counter to the current of modern usage, being that it violates the idea of the genus as it lay in the mind of its founder. The attention of those interested is called to the following historical facts, not given in the Revision.

The name Papilio was established by Linné in the first edition of his Systema Naturæ, in 1735*, where the following division occurs:

ANGIOPTERA.

Alae omnibus datæ, elytris destitutæ.

PAPILIO.	Rostrum spirale, alae 4.	Papilio alis erectis. Psyche alis planis. Phalaena alis compressis.

Here the typical Papiliones are the butterflies in general. The succeeding genera of Angioptera are *Libellula*, *Ephemera*, *Hemerobius*, *Panorpa*, *Raphidia*, *Apis*, *Ichneumon* and *Musca*.

In the second edition of the same work (1740) we find the following on p. 60:

153. PAPILIO. *Cauda simplex*, *alae* iv. *Rostrum spirale seu nullum.*

Pap. antennis clavatis, pedibus 4.
" " " 6, alis erectis angulatis.
" " " 6, " rotundatis.
" " " 6, alis patentibus.
" " " 6, alis reflexis.

Pap. ore spirale, antennis subulatis.
" " " barbatis.
" nullo, " subulatis.
" " " barbatis.

* I have only been able to consult Fee's reprint, Paris, 1830, p. 76.

The butterflies with aborted front legs (*i. e.*, Nymphales) are here placed at the head of the series.

The third edition (1740) was but a reprint of the first, for German students.

The following arrangement occurs on p. 94 of the fourth edition (1744.):

160. PAPILIO. *Antennæ clavatæ.*

P. pedibus 4.
" 6, alis erectis angulatis.
" 6, " rotundatis. } le Papillon.
" 6, alis patentibus.
" 6, alis reflexis.

Here Papilio is still further restricted, always in the direction of the butterflies, and those with atrophied front legs are still at the head of the series.

In the year 1746 the first edition of the Fauna Suecica was published, in which Linné for the first time treats of species, giving to them names in the language of the country. The butterflies are found on pp. 232–248, and are divided into two groups, as follows:

[232.]* Pedibus quaternis unguiculatis.
[240.]** Pedibus sex unguiculatis.

The so-called tetrapods still at the summit. The species are numbered from 772 to 807; the species afterwards named *antiopa* is No. 772; that called *machaon*, No. 791.

In the fifth edition of the Systema Naturæ (1747), under Gymnaptera, p. 68, is an exact repetition of what is found in the second edition.

The sixth edition (1748) contains the following on p. 63:

185. PAPILIO. *Antennæ clavatæ.*

1. Papilio pedibus 4, alis erectis angulatis.
morio Fn. 772.
polychloros Fn. 773.
urticana Fn. 774.
C. duplex Fn. 775.
oculis pavonis Fn. 776.
ammiralis Fn. 777.
belladonna Fn. 778.

2.	Papilio pedibus 4, alis erectis rotundatis.	imperator Fn. 779. comes Fn. 783.
3.	Papilio pedibus 6, alis erectis angulatis.	regina Fn. 791. canicularis Fn. 795.
4.	Papilio pedibus 6, alis erectis rotundatis.	brassicaria Fn. 799. aurora Fn. 801. alpicola Fn. 802. argus Fn. 803–806. butyracea Fn. 807, 808.

Here not only are the four-footed butterflies placed first, but, as in the Fauna Suecica, "*morio*" (*i. e., antiopa*) heads the list, followed directly by the butterflies most closely allied to it—*polychloros*, *urticæ*, *c-album*, *io*, *atalanta* and *cardui*, in the same order as they occur in the Fauna Suecica, to which the numbers on the right refer.

In the seventh edition (1748), exactly the same is found on p. 63.

The eighth edition contains no animals.

In the ninth edition (1756) we find precisely the same as in the sixth excepting in the first line, which reads, p. 69 :

196. PAPILIO. *Antennæ clavatæ.* le Papillon.

Not until the tenth edition (1758) of his great work, did Linné place the "swallow-tails" at the head of the genus Papilio, in the order too well known to require repetition here. In view of these facts, it is worth enquiring: In Linné's mind, which was a *typical* Papilio—Antiopa or Machaon? and was there, or was there not, any reason for specially selecting Antiopa as the type of Papilio, when it was found, in 1872, that by Schrank's first limitation of the genus, in 1801, it must be applied to some one of the Nymphales?

ENTOMOLOGICAL NOTES.

BY W. V. ANDREWS, NEW YORK.

Mr. J. E. Fletcher has a note in the March No. of *Newman's Entomologist*, on "Controlling Sex in Lepidoptera." He says: "During last summer, I had a few larvæ of *Exapate congelatella* feeding on privet; as I was greatly occupied with other things, they were neglected; the supply

of food was very irregularly given and short in quantity, yet the moths produced from them consisted of four males, full sized, and eleven females, some of these latter being much below the average of the species in size."

I presume that the reason Mr. Fletcher supposed that the result may have been very different was because he had read in "Newman" the result of an experiment performed by an American lady, I think Mrs. Treat, who, having underfed a lot of larvæ, succeeded in producing all males, the inference drawn being that males were simply underfed females. I wrote some notes on this subject for "Newman," thinking that Mrs. Treat's paper had appeared originally in that publication. It seems, however, that it did not, and I now reproduce the substance of those notes here, as more likely to meet the eyes of all concerned.

First, then, I would remark that this clearly is not Nature's method of "controlling sex." If a batch of larvæ, say of *V. antiopa*, all feed on the same elm, there will be produced both males and females, although the feeding must be alike for all. But there is an excellent opportunity afforded Mrs. Treat of testing the value of her theory, by the larva of *Thyreus Abbottii* (Swains.) It is well known that the male larva of this species is altogether different in color from that of the female, so the sexes are easily distinguished.

Now, if Mrs. Treat will take the female larvæ, and by underfeeding it *produce male imagines*, the thing will be more satisfactory. I am not unaware that in Hymenoptera food is said to have a good deal to do with the production of sex, but still Mrs. Treat's experiment cannot be considered as conclusive.

Hasty generalization is a fault to which we are very liable, and doubtless the ambition to discover a new law is very laudable. A case of this nature occurs in your No. 5, vol. 6. In a paper appearing in that number, Mr. Gentry, of Germantown, fancies he has discovered the law which produces difference of color in caterpillars of the same species. Now, to be of any value, this law must be universal, and the facts of the case do not show any such universality. Mr. Gentry thinks that the difference in color and markings where this occurs is attributable to the difference in the chemical constituents of the food plant at different seasons of the year. He selects as one instance the larva of *Eacles imperialis*, and gives, correctly enough, three varieties of color. But, unfortunately, these varieties occur at one part of the season as well as at

another, and the varieties may be found feeding on the same tree. How, then, can the food have anything to do with the variation? *Eacles imperialis* is single brooded with us, but still the larva is found in August as well as in October, and no difference in color is observable at one time more than another. In a previous number I related an experiment made with a brood of *imperialis*, and, in that case, every one of the larvae were dark.

The chemistry of biology is doubtless a very abstruse subject, but it is well worth any labor that may be bestowed on its investigation. The larva of *A. luna* feeding, say, on Sweet Gum, produces an insect of a beautiful green color. That of *Eacles imperialis*, feeding on the same food, produces an insect of which yellow and purple are the predominant colors, while that of *regalis* produces an imago yellow and red. Here are larvae all similarly constituted as regards masticatory and digestive powers, and the substance acted upon is the same in each case, and yet how different is the result. This is very wonderful. What is there in the constitution of the digestive organs of these respective larvae that enables one to eliminate this color, and another that? Of course similar results may be observed in other animals, and the same beefsteak may contribute to the growth of a negro as well as of a white man, but still this does not diminish the difficulty we have in understanding how it is done. Entomology is a fascinating pursuit, looked at as merely an amusement, but I have an abiding faith that it is destined to throw more light on the phenomena of life than perhaps any other branch of science can. But we must avoid hasty conclusions.

I have selected only one instance from Mr. Gentry's paper, but there are others. For example, the same objections may be made in the case of *Sphinx 5-maculata* as are made in that of *imperialis*. The different colors appear at the same season, and may be found feeding on the same tomato plant.

ON THE LARVA OF CATOCALA ULTRONIA, Hubn.

BY THE EDITOR.

For several years past, while jarring our plum trees for Curculio in June, we have taken the larva of a Catocala usually less than half grown, but have never succeeded in rearing any of them until this season, when

from three larvæ taken on the 16th of June, one has been successfully brought through its various stages, and proves to be *ultronia*.

The following description was taken at the time of its capture, when it was nearly full grown.

Length 1-60 inches, onisciform.

Head medium sized, flattened in front, slightly bilobed, dull bluish grey, with the front flattened portion margined with a purplish-black stripe. Under a lens the surface appears thickly dotted with pale and dark colored dots and streaks, with a few short, pale, scattered hairs.

Body above dark dull grayish brown, appearing under a magnifying power thickly studded with brownish dots on a paler ground. Second segment a little paler than the others. A sub-dorsal row of dull reddish tubercles, one on each segment from second to fourth inclusive, but behind this there are two on each ring to the twelfth segment inclusive, the anterior one being the smallest, while the posterior and largest tubercle is more decidedly red, all encircled with a slight ring of black at their base. On the ninth segment above there is a prominent, nearly upright stout, fleshy horn, about one-twelfth of an inch long, pointed and similar in color to the body, but with an irregular grayish patch at each side. On the twelfth segment the two hinder tubercles are somewhat increased in size and united by a low ridge, tinted behind with deep reddish brown; there is also an oblique stripe of the same color extending forward from the base of the tubercles to near the spiracle on this segment. The terminal segment is flattened and has a number of small pale reddish and blackish tubercles scattered over its surface. In front of each of the smaller sub-dorsal tubercles, from fifth to twelfth segments inclusive, there is a dull white dot, and one also of a similar character in front of each of the spiracles along the middle segments of the body; from each of the tubercles throughout there arises a single dark short hair. Spiracles large, oval, dull grayish, faintly encircled with black. Along the sides of the body, close to the under surface, is a thick fringe of short, fleshy looking hairs of a delicate pink color.

The under surface is also of a delicate pink, of a deeper shade along the middle, becoming bluish towards the margins, with a central row of nearly round, velvetty black spots, which are largest from the seventh to the eleventh segments, inclusive. The anterior segments are greenish white, tinted with rosy pink along the middle, with a dull reddish spot at

the base and behind each pair of feet. Feet pale greenish, spotted outside and tipped with black; prolegs dull greyish brown, margined with black.

This larva became a pupa on the 21st of June, and remained in this state for twenty-four days, producing the imago on the 15th of July.

MICRO-LEPIDOPTERA.

BY V. T. CHAMBERS, COVINGTON, KENTUCKY.

(Continued from page 130.)

ASPIDISCA.

For the purpose of comparing it with the other species, I quote here Dr. Clemens' description of

A. splendoriferella.

"Head golden; antennæ fuscous, tinged with golden. Fore wings from the base to the middle leaden grey, with a splendant lustre, and from the middle to the tip golden, with a broad, nearly straight, metallic, silvery streak, extending from the costa, near the tip, to the middle of the wing, and dark margined on both sides. This is nearly joined by a dorsal streak of the same hue, almost opposite to it, with converging dark margins, and with a blotch of dark brown scales adjoining it behind. In the costo-apical cilia is a short, blackish brown streak, parallel to the dark margin of the silvery costal streak. At the tip is a black, apical spot, with metallic, silvery scales in its centre, and a few silvery scales in the ciliae above and beneath it. A blackish brown hinder marginal line in the ciliae, interrupted by a silvery streak in the ciliae beneath the apical spot, and the ciliae yellowish brown. Hind wings leaden gray, and the ciliae yellowish brown."

There is a straight black streak in the ciliae, from the apical spot to the apex, not mentioned by Dr. Clemens.

Alar ex. 2 lines or less. I have made some other observations on it in its various stages, vol. 3, ante p. 223. As there stated, it mines the leaves not only of the Apple, in which Dr. Clemens found it, but also those of the Haw *(Cratægus)*, Pear *(Pyrus)*, Wild Cherry *(Prunus serotina)*, and since then I have found it mining the leaves of the Quince *(Cydonia)*. All of these trees (except, perhaps, the Wild Cherry) are so nearly related that it is not surprising to find in the leaves of any one of them any larva which mines the leaves of another, and the Wild Cherry is such a favorite food with the larvæ of Lepidoptera, that it is not surprising to find any larva feeding on it which is not exclusively attached to some single species. Thus an *Ornix*, which mines Apple leaves, also mines those of the Wild Cherry. *Tischeria malifoliella* Clem., and *Lithocolletis cratægella* also both mine the leaves of all the above named trees except, *perhaps*, the Pear and the Quince. The fact that *A. splendoriferella* mines the leaves of the trees named, affords no presumption then that it is a general feeder, or that it mines the leaves of any tree not closely allied to the Haw.

I make these suggestions because Mr, Stainton, in the preface to his very valuable addition of the writings of Dr. Clemens (for publishing which he has the hearty thanks of every student of the American Micros), states that he has bred from Aspen leaves, from Oregon, a species which it would be very hard to distinguish from *A. splendoriferella*. But because of the difference in the food plants, Mr. Stainton (rightly, I think) considers it a different species. If the vignette upon the title page of Mr. Stainton's edition, above named, is, as I suppose, intended to represent the mined Aspen leaf, I think it establishes the specific character of the Aspen species. The hole left in the Aspen (judging from the vignette) is very nearly an ellipse. That made by *A. splendoriferella* is much wider in proportion to its length, being nearly as wide as long, and the case is almost angulated at the sides. The mines of the Micro-Lepidoptera, and the larval cases of the case-bearing species, and the modes of pupation, and forms and colors of their cocoons and pupa cases, have specific characters as distinct as the galls made by the *Cynipidæ*. The color of a pupa case, cut from a leaf, depends, for instance, not only on that of the leaf, but of the silk with which it is lined and the color of the enclosed larva and pupa. But I have never been able to detect a difference between the pupa cases of *A. splendoriferella* from any of the leaves mined by it, as above stated. See remarks under the next species.

A. juglandiella. N. sp.

Except that it is *perhaps* a trifle smaller, I can not distinguish this species in the imago from *A. splendoriferella*. Nevertheless, I consider it a distinct species. The pupa case is oblong oval, much narrower in proportion to its length, and smaller in every way than that of *A. splendoriferella*, besides being more pointed at the end by which it is attached. Besides, although *splendoriferella* is much the most common species (at least 1000 mines of *splendoriferella* being found to a single one of *juglandiella*), yet I have never met with a mine of the former earlier than the latter part of July, whilst the mines of the latter are as abnndant, or nearly so, in the latter part of May as at any time. The first mines of *juglandiella* that I discovered were in the leaves of a small Walnut tree, which stands under a large Wild Cherry tree. It was early in June. I found several mines, but they were not by any means abundant. Not a mine could I find on the Wild Cherry, either at that time or for two months afterwards. *Juglandiella* continued to mine the leaves of the Walnut throughout the season, but never became abundant. But from the latter part of July, on through the season, the mines of *splendoriferella* were abundant, not only in the leaves of that particular Wild Cherry tree, but in those of all the species mined by it, and by October the leaves were riddled with the holes left by cutting out the cases. The pupa case of *splendoriferella* is much larger than that of *juglandiella*, though there is no appreciable difference in the size of the insects. The former is dark yellowish, while the latter is brown. I have taken the latter species mining Walnut leaves at a great distance from any Wild Cherry trees, as well as close to them. (See also the remarks under *A. splendoriferella*.)

A. saliciella. N. sp.

Silvery. Antennæ faintly tinged with fuscous. There is a triangular white costal spot before the ciliæ, and an opposite dorsal one, each dark margined before and behind; *the space between these two streaks and behind them to the apical spot is silvery*. There is a golden yellow patch on the end of the disc immediately before the space, between the two streaks above mentioned (the costal and dorsal white streaks). Another golden yellow patch behind the costal streak, on the margin, with a very indistinct and small black costal streak in it; another golden yellow patch on the dorsal margin, behind the dorsal streak, and behind it is a blackish patch covering the base of the dorsal cilia. Apical spot black, and adjoining it

behind is a fan-shaped dark brown patch at the base of the apical cilia. Ciliæ silvery, *and not containing a black streak from the apical spot to the apex.*

The italics above indicate the differences between it and *A. splendoriferella*, and besides, it is much smaller than either that species or *A. ella*, having an *alar ex.* of less than ⅛ of an inch, and thus smaller than *Nepticula microtheriella*, which, Mr. Stainton says, is the smallest heretofore known Lepidopteron. Besides, the antennæ are not so distinctly fuscous as in *splendoriferella*, and the golden portions of the wing are not so deep or reddish golden as in that species. It resembles that species more closely than either *A. ella* or *A. lucifluella*. The pupa case is oblong ovate, brownish, not so much pointed at the anterior end as that of *A. juglandiella*, and is a little smaller.

Dr. Clemens found a mine and larva in the leaves of the White Willow *(Salix alba)*, which he called *A. salicicella*, but he was not acquainted with the imago. I have not met with that mine, my species having been bred from the Weeping Willow. But as I have no doubt that it is the same species, I have adopted his name.

A. ella. Ante v. 3, p. 224.

In the description of this species I have used the word "before" where I should have written "behind," as to the location of the costal streaks; and the whole description is so unsatisfactory that I wish to redescribe it. It is, however, difficult to get a good description of a species which does not present the same appearance in any two views of it.

Head, palpi, thorax and basal half of the primaries pale grayish silvery. Antennæ fuscous above, silvery beneath. Apical half of the primaries black along the *dorsal* margin, the black spreading over the middle of the apical portion of the wing to the golden yellow *costal* part of the apical half of the wing. This golden yellow costal portion extends along the entire costo-apical margin, and along the middle of the apical portion of the wing it passes gradually into, or blends with, the blackish dorsal portion. (Perhaps a more correct description would be: apical half of the wing golden along the costal half, blackish along the dorsal half, the two colors meeting and blending with each other in the middle, and the black passing into the base of the dorsal cilia.) In some lights the golden is strongly tinged with red, and the black becomes a deep golden brown. *In the black dorsal portion*, behind the middle of the dorsal margin, is a triangular silvery streak; and opposite to it, *in the*

golden costal portion, is another, the two almost meeting so as to form a fascia, and both dark margined on both sides ; behind the costal streak, at the end of the golden portion and before the apex, is another small costal silvery streak, which is distinctly dark margined before by a straight line, and faintly behind by an oblique one. Apical spot black, and behind and adjoining it is a fan-shaped, dark brown spot, behind which is a straight dark brown streak in the ciliæ, extending to the apex. The apical spot is margined before and on each side with brilliant, metallic, silvery scales, as in *splendoriferella*.

Al. ex. 2 lines or less. Same as in *splendoriferella*, but this species is slenderer than that. The first costal and the dorsal streaks are as in that species, but there is much less golden in the apical half of the wing, and much more blackish or dark brown. The apical spot and adjoining fan-shaped patch and apical streak are as in *splendoriferella*, but in *splendoriferella* there is but one costal streak. It is, in fact, less like *splendoriferella* than any of the other species. The pupa case is nearly an ellipse, slightly oval, golden yellow, marked with small brown dots.

I was at first in doubt whether this might not be Clemens' *A. lucifluella*, which mines Hickory leaves. But I cannot reconcile it to the requirements of his description, which says that *lucifluella* is larger than *splendoriferella*, and has three costal streaks. I have met with the larva of *lucifluella*, but have not succeeded in raising it. Dr. Clemens met with another mine in the leaves of the Hornbean, which he called *A. astryaefoliella*, but the maker of the mine is still unknown. Possibly it may prove to be this species.

[Since the foregoing remarks were written, I have observed that the microscopic hairs (vegetable) on the surface of the case of *A. clla* are identical with those on the under surface of Hickory leaves. and this tends to the conclusion that this is Clemens' *lucifluella ;* but other leaves may have similar hairs. The fact that I can not recognise it in Dr. Clemens' description is by no means conclusive, for my own first description is certainly defective, and the shades of coloring vary so with the play of the light, that it is a very difficult species to describe satisfactorily.]

ERRATA.—*Ante* p. 128, under *C. gigantella*, in line 5 of the description, for "these" read "three ;" p. 129, for *fagi-costicella* read *fagi-corticella*.

PRELIMINARY CATALOGUE OF THE NOCTUIDÆ OF CALIFORNIA.

BY AUG. R. GROTE,

Curator of Articulata, Buffalo Soc. of Natural Sciences.

1. *Bombycia improvisa* (Hy. Edw.,) Proc. Ac. N. S., Cal., 5, p. 189.

"Cascades, W. T." Unknown to me and perhaps incorrectly referred to this group.

2. *Pseudothyatira expultrix* Grote.

"Cariboo, B. C.," Hy. Edw., l. c. Unknown to mé from the West Coast.

3. *Habrosyne scripta* (Gosse.)

"Alaska" (?) Hy. Edw., l. c. Sitka, No. 137, Hy. Edw.

4. *Acronycta lupini* Behr., Bull. Buff. Soc. N. S., 1, p. 79.

One specimen.

5. *Acronycta lepusculina* Guenee, Bull. Buff. Soc. N. S., 1, p. 130.

A fresh specimen sent by Mr. Behrens gives me some reason to doubt this determination and to suspect a distinct species, allied to *A. leporina* and *A. lepusculina*, in California. The fore wings are narrower, the markings more obliterate above. A different material from that now accessible to me is needed to make any change in this determination or to confirm it with positiveness.

6. *Acronycta perdita* Grote.

♂ Nearest resembling *A. xyliniformis* of any of our Eastern species, but larger, more robust, and with the fore wings even darker. There is an absence of any softer shadings before and behind the transverse posterior line. All the markings are coarser. The terminal series of black interspaceal marks are large and heavy. The transverse posterior line has the outer dentations more uneven; the teeth on veins 4 and 6 are notably longer; the line itself seems hardly so near the terminal margin as in *xyliniformis*. The black shade streak at anal angle is heavier and the dash on the median space is different in position, more incon-

spicuous and near the t. a. line. The median shade is less prominent and the t. a. line more distinct and widely geminate. Hind wings white, like *xyliniformis*, but the fringe is merely black dotted, not cut with black as in the Eastern species. The palpi exceed the front more prominently than in *A. xyliniformis*. *Exp.* 40 m. m. "June 5th," Mr. Behrens.

7. *Feralia februalis* Grote. List of the Noct. of N. Am., p. 60.

"Sanzalito," Mr. Behrens, "February 12th."

8. *Agrotis saucia* (Hubner), Bull. Buff. Soc. N. S., 1, p. 135.

"Oakland," No. 15, Mr. Behrens.

9. *Agrotis fennica* (Tauscher.)

"Kodiak," No. 13, Mr. Behrens. A single ♂, which agrees with Herrich-Schaeffer's figure 146, except that the hind wings are very pale and whitish.

10. *Agrotis lycarum* Herrich-Sch., figs. 122–124.

No. 1392, Mr. Hy. Edwards; No. 31, Mr. Behrens. This species, which seems to be very common in California, I have determined with hesitation. I cannot discover, however, any difference of importance between Herrich-Schaeffer's figures, above cited, and the material before me.

11. *Agrotis Vancouverensis* Grote, Bull. Buff. Soc. N. S., 1, p. 134, plate 4, fig. 4.

"Vancouver's Island," No. 2624, Mr. Hy. Edwards.

12. *Agrotis formalis* Grote, List of the Noctuidæ of N. Am., p. 61.

California, Mr. Behrens.

13. *Agrotis Wilsoni* Grote, List of the Noct. of N. Am., p. 62.

California, Nos. 12 and 24, Mr. Behrens.

14. *Agrotis specialis* Grote, List of the Noct. of N. Am., p. 62.

California, Mr. Behrens.

15. *Agrotis fuscigerus* Grote.

♂ ♀. A species closely resembling *A. Cochrani*, but with notably darker and more fuscous hind wings in either sex. The primaries are

much darker, more evenly colored, without that mottled appearance which has induced Mr. Riley's comparison of *Cochrani* with *chenopodii*. The lines are variably distinct; when present, the inner component line of the t. p. line is usually broad. The four specimens (♂ ♂ ♀ ♀) sent by Mr. Behrens under the No. 25, and as taken Sept. 13th and 14th, expand—♂ 30, ♀ 35 m. m., and cannot be referred to *Cochrani*.

16. Agrotis Hollemani Grote.

A small species with all the tibiæ spinose; the fore tibiæ have two rows of strong spines. Antennæ pubescent. Fore wings of a dark bluish grey, with hardly a trace of the usual lines. A strong black basal stripe; the cell shaded with black about the discal stigmata, which are singularly shaped, the orbicular elongate and fusing with the moderate, excavate reniform, so that we are reminded of *Oncocnemis Chandleri*. The terminal space is indicated by interspaceal black streaks. Fringes concolorous with internal hair line. Hind wings blackish fuscous, with whitish fringes divided by a hair line. Beneath whitish, powdered with fuscous, without lines; hind wings with a minute discal dot. Head and thorax like primaries; collar with a dark superior line. *Expanse*, 30 m. m. Siskiyou Co., Cal., Capt. Holleman. From Prof. A. S. Packard, jr.

17. Mamestra cuneata Grote, Bul. Buf. Soc. N. S., 1, p. 139, plate 4, fig. 9.

No. 21, Mr. Behrens. "Mendocino, No. 21. The dot near internal angle of fore wings is always yellow; in a few specimens, probably rubbed, it is not noticeable.

18. Mamestra chartaria Grote, Bul. Buf. Soc. N. S., 1, p. 138, plate 4, fig. 12.

California, Mr. Behrens.

19. Mamestra niveiguttata Grote, Bul. Buf. Soc. N. S., 1, p. 140, plate 4, fig. 16.

California, Mr. Hy. Edwards.

20. Mamestra puerilis Grote, List of the Noct. of N. Am., p. 64.

California, Mr. Hy. Edwards and Mr. Behrens.

21. Mamestra cinnabarina Grote, Proc. Bost. Soc. N. H., 16, p. 241.

California, Mr. Hy. Edwards and Mr. Behrens. Several specimens show a range of variation in the extent of the brown and palest tint on the primaries above.

22. Mamestra laudabilis (Guen.)
California, Mr. Hy. Edwards.

23. Mamestra 4-lineata Grote, Bul. Buf. Soc. N. S., 1, p. 140, plate 4. fig. 15 and List, p. 13.
California, Mr. Hy. Edwards and Mr. Behrens.

24. Dianthœcia leucogramma Grote, List. p. 64.
California, Mr. Hy. Edwards and Mr. Behrens.

25. Dianthœcia rufula Grote, List of the Noct. of N. Am., p. 64.
California, Mr. Behrens. "Oakland, No. 22."

26. Dianthœcia insolens Grote, List of the Noct. of N. Am., p. 65.
California, Mr. Behrens.

27. Oncocnemis Behrensi Grote, List of the Noct. of N. Am., p. 65.
California, Mr. Behrens. "Sanzalito, Feb. 10th to 24th."

(To be Continued.)

CORRESPONDENCE.

GRAPTA COMMA AND DRYAS.

DEAR SIR,—

I am able to give you the results of an experiment made with *Grapta comma*, the converse of that made in 1873 with *dryas*. On the 10th of May last I took a female, true *comma*—red hind wings and plain brown underside—and tied it up to a branch of Hop-vine, which branch was free from eggs of any sort. She laid in the bag some forty eggs, and I had from them thirty-nine caterpillars. Most of them in due time reached the chrysalis state, and between the 10th and 15th of June there emerged thirty-four butterflies—every one a *dryas*. In the fall of 1873, from eggs of *dryas*, there resulted a large number of *comma* and six *dryas*, as stated in the ENTOMOLOGIST for October. I think this fully settles the question of the dimorphism of the species.

Yours truly,

W. H. EDWARDS, Coalburgh, W. Va.

MISCELLANEOUS NOTES.

DEAR SIR,—

I send you the following items, hoping they may prove of interest:

CLISIOCAMPA SYLVATICA.—The caterpillars of this pest are swarming on almost every description of tree or shrub in the vicinity of this city, many trees being completely denuded of foliage. *C. Americana* is also common on apple trees.

LACHNOSTERNA QUERCINA. — This insect, though usually very abundant, has been quite scarce this season; I have not seen more than a dozen specimens.

DEPRAVED TASTE OF P. TURNUS.—One day early in June a *P. turnus* which I was pursuing hovered over and alighted upon some cow droppings, thrust out its tongue, and settled itself quietly to its disgusting repast. While in this position it was easily captured.

On the 27th of July, last year, it rained very heavily during the evening in the vicinity of Portland, where I was spending the summer; but the night seemed very favorable for moths, a large number entering the house, among them a fine specimen of *Philampelus satellitia*, two of *Arctia virgo*, and one of *Arctia rubricosa*, besides a number of others with the names of which I am not acquainted.

DESCRIPTION OF THE EGG OF GASTROPACHA AMERICANA.—The eggs of this moth are very pretty, being white with peculiar black markings. They were laid June 27th, by a female reared in confinement. Length .06 of an inch; width, .045. Form oval, flattened at the base and also above, but a little thicker at one end than at the other. At each end there is a semi-circular stripe and dot, closely resembling the crescent and star of the Turkish arms, and these markings are larger and more distinct on the larger end. On both the flattened surfaces there are markings like eyes, each formed by an oval spot in the centre, with a curved stripe above and a shorter straight one below, of which the latter is widened towards the extremities. Between and parallel to the two eye-brow-like marks there is another black stripe which is widest at the larger end of the egg, and tapers towards the other. Over the whole surface there is a minute indented reticulation, the meshes of which are irregular in form, with a depressed dot in the centre of each.

H. H. LYMAN, Montreal, P. Q.

DEAR SIR,—

A few days ago I went to a swamp where *Phœton* feeds in early spring, and discovered several of the webs of that species spun over the stems of *Chelone glabra* and whatever other plants were contiguous. Within the webs were larvae about ¼ inch long, and as during the last few days, since I have had a number of them in the house, there is no appearance of feeding by the larvae, I presume they are quiet for the season and till next March. Seeing a good many *Phyciodes marcia* flying in the swamp, it occurred to me to try a female with a stem of *Chelone glabra*, and I did so with satisfactory results, as three days after I enclosed her in a bag, she laid about 75 eggs on the under side of one of the leaves. I hope I have at last found the food plant of this species, after having tried a score of plants to no purpose.

W. H. EDWARDS.

EDITORIAL SUMMARY.

PALÆONTOLOGY OF ONTARIO.—We are much pleased to observe that the Legislature of this Province is extending its liberality in the cause of Science to other departments, besides those somewhat utilitarian branches of Entomology and Horticulture, as is eminently manifest from the excellent Report before us on the Palæontology of Ontario. It has been prepared by Prof. H. Alleyne Nicholson, of the University of Toronto, and contains descriptions and figures of the organic remains of the Devonian Formation of Western Canada. No less than one hundred and sixty species of fossils are described, and illustrated by means of nearly sixty wood-cuts in the text, and eight splendid lithographic plates. It is noteworthy, also, that all the figures are original, except two of the wood cuts. We trust that the Legislature will long continue its assistance to this excellent work, and that Prof. Nicholson may be enabled to carry out a complete investigation of the Palæontology of all the fossiliferous geological formations in this country.

AMONG the "old country" publications that we have lately received, we may mention the 15th number of the *Scottish Naturalist* (Dr. F. B. White, Perth.) We gather from its pages that a goodly number of Field Clubs are being organized in Scotland, and that much satisfactory work

is anticipated from them. Cannot something of the kind be re-inaugurated here with a fair promise of success?————*Nature* continues to be as well filled as ever with most interesting and instructive matter; recent numbers have contained seasonable articles upon the Comet and the Transit of Venus, and a series of illustrated papers upon the observatories of the United States.————European potato growers are beginning to become alarmed at the prospect of a speedy invasion of their fields by the devastating Colorado Beetle. As it has now very nearly reached the Atlantic seaboard, we have little doubt that in another year or two it will succeed in crossing the ocean and striking terror into the hearts of all patriotic Irishmen. Mr. Newman, in a recent number of his "Entomologist," while he confuses the sweet potato with the ordinary potato, and the insects that prey upon these very different plants, expresses his disbelief in the prospect of trouble from any of our American pests. He goes on, however, to quote all the remedies against the Colorado beetle contained in the Report of our Society—without acknowledgement!

We regret to announce the death of Mr. Geo. R. Crotch, M. A.. of St. John's College, Cambridge, who sailed from England to America in 1872 for the purpose of studying the Entomology of parts which he considered incompletely known. He made collections, especially of Coleoptera, in California, Vancouver's Island, Oregon and other Districts. So much were his labors valued in England that his University on two occasions voted him a sum of money to aid him in the formation of collections for the Museum at Cambridge.

The 23rd Meeting of the American Association is to take place this month at Hartford, Conn., beginning on August 12th. Dr. LeConte is the President elect. As an invitation was extended at the Portland meeting to the members of the Entomological Society of Canada to be present on this occasion, we trust that many of our friends will make a point of attending; there will no doubt be a large attendance of insect hunters from all parts of the continent.

The 44th Meeting of the British Association is to be held at Belfast, under the Presidency of Prof. Tyndall. It is to commence a week later than that at Hartford.

C. J. S. B.

The Canadian Entomologist.

VOL. VI. LONDON, ONT., SEPTEMBER, 1874. No. 9

THE AMERICAN ASSOCIATION.

At the recent gathering of this scientific body, in Hartford, Conn., there were brought together an unusual number of Entomologists. This was owing partly, no doubt, to the kind invitation extended by the Association to the American and Canadian Entomological Societies, to appoint special meetings of their members to be held at that time and place, with the view of having these important Societies fully represented. In response to this invitation, a number of members of the American Entomological Society were present, while our Canadian Entomologists were represented by the worthy President of our Society, Rev. C. J. S. Bethune, M. A., and the Editor of the ENTOMOLOGIST. Several evenings were occupied by these "brethren of the net" in interesting and profitable discussions on the habits and peculiarities of various insects, the time passing so pleasantly that the midnight hours were reached ere a separation could be effected. After mature deliberation it was resolved to organize under the name of "The Entomological Club of the A. A. A. S," and the following constitution was adopted :

TITLE.

I. The name of the association shall be "The Entomological Club of the American Association for the Advancement of Science."

OBJECTS.

II. The annual reunion of the Entomologists of America, the advancement of entomology, and the consideration of all general questions relating to the science that may from time to time arise.

MEMBERSHIP.

III. All members of the American Association for the Advancement of Science who are interested in Entomology, shall *ipse facto* be members of the club.

OFFICERS.

IV. The officers of the club shall be a President, a Vice-President, and a Secretary, to be elected annually by vote of the members.

DUTIES OF THE OFFICERS.

V. The President, or in his absence, the Vice-President, shall preside at all meetings; the Secretary shall perform all the usual duties of a recording and corresponding secretary.

MEETINGS.

VI. A meeting shall be held in each year at the place of meeting appointed by the American Association for the Advancement of Science; it shall commence at 2 : 30 p. m. on the day before the meeting of the American Association for the Advancement of Science, and be continued throughout that evening; further meetings may be held as time will permit during the week following.

The following resolutions were also unanimously passed:

Resolved, That the members of the American Entomological Society and the Entomological Society of Ontario, together with all other persons interested in entomological science, be cordially invited to attend and take part in the proceedings.

Resolved, That the secretary be requested to publish notices of the meeting in such periodicals devoted to natural history, and especially in those devoted to entomology as are published on the continent; and further, that the members be requested to bring with them at the annual reunions specimens for exchange and exhibition, and especially types of species that they may have described during the year.

At a subsequent meeting of the Club, the following officers were elected: President, Dr. John L. LeConte, Philadelphia, Pa.; Vice President, Samuel H. Scudder, Cambridge, Mass.; Secretary, Chas. V. Riley, St. Louis, Mo. We feel sure that under such able direction, the Entomological Club of the A. A. A. S. will prosper, and be the means of stimulating many to increased effort, and thus greatly advance the interests of our favorite study.

As it may interest many to know who were present at these meetings, we furnish the following list: Dr. John L. LeConte, Philadelphia, Pa.; Dr. J. G. Morris, Baltimore, Md.; Prof. S. S. Haldeman, Chickis, Pa.; Dr. H. A. Hagen, Cambridge, Mass.; S. H. Scudder, Cambridge, Mass.;

A. R. Grote, Buffalo, N. Y.; Dr. G. M. Levette, Indianapolis, Ind.; C. V. Riley, St. Louis, Mo.; O. S. Westcott, Chicago, Ill.; J. A. Lintner, Albany, N. Y.; H. F. Bassett, Waterbury, Conn.; George Dimmock, Springfield, Mass.; B. Pickman Mann, Cambridge, Mass.; E. P. Austin, Cambridge, Mass.; Dr. R. King, Kalamazoo, Mich.; Chas. P. Dodge, Washington, D. C.; Mr. Patton, Waterbury, Conn.; Rev. C. J. S. Bethune, M. A., Port Hope, Ont.; W. Saunders, London, Ont. During the meetings of the Association several interesting and valuable papers on Entomological subjects were read by Dr. LeConte and Messrs. Scudder, Riley and Grote.

THE LINNEAN SIGNIFICATION OF THE GENERIC TERM PAPILIO.

BY H. HAGEN, CAMBRIDGE, MASS.

In a recent issue of the CANADIAN ENTOMOLOGIST, No. viii, Vol. vi, there appears from the pen of Mr. Scudder a paper on "The Linnean Signification of the Generic Term Papilio," containing some statements on which I propose to offer a few remarks.

The data given by Scudder from Linné's works are—save some minor typographical errors—correct, excepting in two important points. On p. 144 he says "in the year 1846 the first edition of the Fauna Suecica was published, *in which Linne for the first time treats of species, giving to them names in the language of the country.*" (The italics are mine.)

In the first place, Linné did never give either to animals or insects names in the language of his country. This is important in view of Mr. Scudder's proposition in "Psyche" to give such names for the convenience of non-entomologists. The names quoted by Scudder, viz., morio, polychloros, &c., are never given by Linné as *names of the species*, but just *at the end of the synonyms, quoted as synonyms*, always in this form, *vulgo* morio. These names were *never invented* by Linné, but were used by former naturalists; some are to be found in Petiver's Museum, viz., Oculus pavonis (not Oculis), Bella Donna, Ammiralis (the Admiral) Argus, in Rajus Hist. Ins. and in Albin. Engl. Insects, Brassicaria, Urticaria, etc.—the others in different other authors. Even Linné used some of them before, in his Elenchus, viz., Bella Donna, Oculus pavonis, and always in this manner:

Bella Donna *dictus*, Oculus pavonis *dictus*, showing clearly that the names were not given by himself. Such names as are quoted with *vulgo* are not numerous, although in much larger proportion in Lepidoptera than in any other order. I find 25 such among 37 Papilio, and 14 Phalenæ only among the 114! described; in other orders the proportion is much less. There is not in the whole Fauna Suecica one name given by Linne. In the rare cases where Linne quotes Swedish names he has never given these himself, but quoted them as synonyms, as in Phal. mori.

Vulgo Bombyx.

Suecis Silkesmask.

In the end of the last and in the beginning of the present century there was a general tendency to give to every insect a name in the language of the country in which it was found. In this work labored Donovan for England, Fourcroy and Geoffroy for France, Sepp for Holland, Isert for Sweden, Bruennich for Denmark, Panzer and Sturm for Germany; but very soon it was seen that this business was a difficult one, often the names were not appropriate, some were foolish, and others even ridiculous, while it was apparent to all that such names, instead of being a benefit to science, were only a burden, and soon the matter was dropped entirely.

Even in the case of injurious insects it is seldom necessary to invent common names, for where species are really destructive the people almost always have a name for such just at hand.

With regard to the *second* point in the paragraph quoted, Linne treats of species first in a paper published in 1736, in Acta literaria et Scientiarum Sueciæ Upsala, T. iv, p. 97–138, *Animalia per Sueciam observata.* This paper is reprinted Lugduni Batav. 1743 in 8vo., *Elenchus animalium per Sueciam observatorum, p. 37–94.* Linne himself quotes this paper later always "Acta Upsal, 1736," and states in the preface of Fauna Suecica, 1st edition, "quum ad patriam Academiam Upsaliensem 1729 degerem, conquirendis insectis primam dedi operam, nec prius destiti, quam visendæ mihi essent 1735 aestivæ regiones. Eorum quæ reperi, catalogum a me exhibitum. Regia Scient. Soc. Upsal. actis suis pro anno 1736 inseruit."*

* When I studied in 1729 at my native Academy of Upsala, I collected chiefly insects, nor did I desist until I started to visit other countries in 1735. Of those which I found, the Royal Scientific Society of Upsala published in their proceedings for the year 1736 a catalogue prepared by me.

The Elenchus (just as the first edition of the Fauna Suecica) has *no names of the species* (I say purposely so, as Linne called NOMINA TRIVIALIA what to-day is called SPECIES NAME, and Linne called NOMEN SPECIFICUM what to-day is called DIAGNOSIS) but always a diagnosis, and where it was possible, quotations of former authors, viz., Petiver Museum and Gazophylacium, Rajus, Albin, &c. The species given in the Elenchus are just as easily recognized as those in the Fauna Suecica, Ed. 1, by comparing the quoted authors and the diagnosis. It follows, therefore, that if the first edition of the Fauna be recognized to have right of priority, the Elenchus must be recognized to have the same right.

Now, the genus Papilio is established in Syst. Nat. Ed. 1, 1735. The Elenchus *is the first publication with species* (1736) after it, and the first Papilio is *P. Rhamni*, quoted as Papilio sulphureus Petiv. Mus. 1. Comparing Petiver's words and Linne's Fauna Suec., Ed. 1, No. 795, the identity of this Papilio sulphureus with P. Rhamni is sure.

I give here the list of the species of the Elenchus and of the first edition of the Fauna Suec., i and ii :

Elenchus.	*Faun. Suec., Ed. i.*	*Ed. ii.*
1. Rhamni mas.	1. Antiopa.	1. Machaon.
2. Rhamni fem.	2. Polychloros.	2. Apollo.
3. Brassicæ.	3. Urticæ.	3. Mnemosyne.
4. Rapæ.	4. C. album.	4. Cratægi.
5. Napi.	5. Io.	5. Brassicæ.
6. Cratægi.	6. Atalanta.	6. Rapæ.
7. Apollo.	7. Cardui & follow	7. Napi & follow
	24. Rhamni.	12. Rhamni.
10. Antiopa.	25. Cratægi.	21. Antiopa.
11. Polychloros.	26. Napi.	22. Polychloros.
12. Urticæ.	27. Rapæ.	23. Urticæ.
13. C. album.	28. Brassicæ.	24. C. album.
14. Io.	31. Apollo.	25. Atalanta.

Follow ; Linne first (1736) places P. Rhamni at the head of the genus Papilio ; second, 1746–48 (the later editions until 1756 are only reprints) P. antiopa at the head, and third, 1758, and following, the swallow-tails at the head, beginning with P. priamus in Ed. x, Syst. Nat., and with P. machaon in Ed. 4, Fauna Suecica.

In the Fundamenta Entomologiæ, 1767, 4to p. 32, Linne speaks about the division of Papilio into five classes, devoting more than a page

to this subject, and says strictly that his *Equites* form the first class, *Heliconii* the second, *Danaii* the third, *Nymphales* the fourth, *Plebeii* the fifth.

The closing lines in Mr. Scudder's paper should therefore be amended so as to read thus: "In Linne's mind which was a typical Papilio—Rhamni, or Antiopa, or Machaon? The answer is simply that Linne in his study arrived at the conclusion that the first class of his Papilio should be formed by the Equites. I would remark, however, that Linne *never speaks*, as far as I know, *of any particular species being the type of its class*, and *this idea that his first species is the type* is of very recent date.

The fact that so few Entomologists have the opportunity of consulting Linne's older works, induced me to publish these statements.

MICRO-LEPIDOPTERA.

BY V. T. CHAMBERS, COVINGTON, KENTUCKY.

(Continued from page 153.)

ANTISPILA.

A. cornifoliella ? Clem.

Can there be two Antispila miners of the Dog-wood? Either there must be, and my specimens are specifically distinct from this species, or Dr. Clemens' description is strangely erroneous in at least one particular, viz., the color of the fascia and streaks, which he says are golden in *cornifoliella*, but which are silvery white in my specimens, all of which—six in number—agree exactly in ornamentation, and all but one of which are bred specimens. The species of the genus generally resemble each other very closely, and some recognized species do not differ from each other more than my specimens do from Dr. Clemens' description. Neither is it improbable that two species mine the leaves of the Dogwood, for the same thing occurs in Europe, where *A. Pfeifferella* and *A. Treitschkiella* both mine the leaves of *Cornus sanguinea*. *A. cornifoliella* and my specimens both mine the leaves of *Cornus florida*. I subjoin Dr.

Clemens' description for the purpose of comparison with my own specimens :

" *Head, face, labial palpi and fore feet dark brown.* Antennae dark brown ; basal joint somewhat ochreous. Forewings rather dull dark brown, with a coppery hue. Near the base is a rather narrow, golden band, *not constricted on the fold, and rather indistinct toward the costa*, where it is somewhat suffused with a coppery hue, and nearest the base on the inner margin. At the apical third of the wing is a small golden spot, and nearly opposite, on the inner margin, another of the same hue, with the hinder portion of the wing tinged with a bright reddish coppery hue ; ciliae dark grayish. Hind wings purplish brown ; ciliae somewhat paler, with a coppery hue."

The italics are Dr. Clemens'. The following description is drawn from the six bred specimens above mentioned :

Head and face dark brown or brilliant metallic, according to the light ; labial palpi yellowish white ; tarsi all yellowish white, with each joint tipped with dark brown on its anterior margin. Antennae dark brown, with the two or three joints nearest the base ochreous, and *the extreme tip white.* Fore wings and thorax dark brown, blackish, bronzed or tinged with purple, according to the light ; before the middle of the wing is a slightly curved fascia, which is widest and nearest to the base on the dorsal margin, *not constricted on the fold, but quite distinct throughout.* A costal and dorsal streak just before the ciliae, the costal streak a little behind the dorsal one. In fresh specimens this fascia and these streaks are silvery white ; in old specimens they have a faint golden hue in some lights. (Clemens describes them as golden.) *Basal half of the ciliæ purplish ; apical half grayish silvery. Al. ex.* scarcely ¼ inch.

Dr. Clemens suggests that *cornifoliella* may be a variety of his *Nysæ foliella.* I have never succeeded in breeding the latter species.

A. isabella, Clem.

I find nearly the same differences between my specimens (bred) of this and Dr. Clemens' description, that I have noted above as to *cornifoliella.* Dr. Clemens says that the fore wings have no greenish or violet reflections, which is certainly incorrect. The fascia is wider than in *cornifoliella*, the thorax more shining metallic, the purple hinder marginal line is less distinct, and the entire wing is less purplish, and the species is a little larger. Nevertheless, they resemble each other very closely. The

costal and dorsal spots in both are of nearly equal size, or the costal one is a little the largest.

A. viticordifoliella. N. sp?

Dr. Clemens mentions a mine and larva in grape leaves to which he gives this name, but he was not acquainted with the imago. Though it sometimes happens that more than one species of a genus mines leaves of the same plant, and it is therefore possible that the species described below may not be the same referred to by Clemens, yet from his description of the mine and larva, I feel confident that it is, and have therefore given it the name suggested by him.

Dark brown, inclining to blue black, with a purplish tinge in some lights, and in some lights bronzy brown or greenish ; thorax and base of the wings with pink, purple or topaz red reflections, according to the light. A nearly straight silvery white fascia before the middle of the wings, not constricted on the fold, widest on the dorsal margin, where it is also a little nearer to the base ; a large triangular silvery white dorsal streak just before the beginning of the ciliae, and a smaller one at the beginning of the costal ciliae. Ciliae white. Tarsi yellowish white, each joint tipped in front with dark brown. Face yellowish white ; antennae dark brown, with about six terminal joints silvery white, and the six preceding ones alternately white and dark brown. It is a little smaller than *A. cornifoliella.* The mine, larva and case are smaller than those of *A. isabella*, and the case is elliptical in shape, whilst in *cornifoliella* and *isabella* it is nearly circular.

A. ampelopsifoliella. N. sp.

This species is known only in the larval state, unless the species described, but not named below, may be the same. The mine, larva and case are very small, smaller than any other known species. It mines the leaves of *Ampelopsis quinquefolia*, and the mine is elliptical in outline. I find that I have mislaid my notes upon the larva. I have never succeeded in breeding it.

Can not something be done towards determining the original of some cultivated plants by a knowledge of the habits of insects which feed upon them? A great majority of herbivorous insects are doubtless polyphagous, but many are confined to a single group of plants, and some to a single species. When an insect known to feed only on a single wild species, if found feeding on an allied cultivated plant, is it not a fair

deduction that the cultivated one is derived from the wild stock? Dr. Clemens states that he bred his species *A. isabella* from the cultivated grape Isabella, which, if I am rightly informed, is supposed to be derived from *Vitis labrusca*. I have bred it from at least a dozen cultivated varieties, including Catawba, Hartford Prolific and Concord, but I have also bred it from the wild *Vitis cordifolia*, so that this instance proves nothing. But Dr. C. records the larva of *A. viticordifoliella* from the leaves of *V. cordifolia* only, and I have never found its mine in any other species or variety. Would there not be a presumption—if it should now be found mining any cultivated variety—that that variety sprang from the *cordifolia* stock? So Dr. C. records *Phyllocnistis vitigenella* from the leaves of *V. cordifolia* only, whilst I have found it in the leaves of a great many cultivated varieties, including those above named, so that it proves no more than *A. isabella;* but *P. vitifoliella* I have never found elsewhere than in the leaves of *V. cordifoliella*, and one or two cultivated vines of which I find I have kept no memorandum.

Some years ago I bought from the gardener of the late N. Longworth, of Cincinnatti, a grape vine of a variety but little cultivated, called "Longworth's Seedling, No. 20," the origin of which the gardener refused to tell me. The foliage is unlike that of any other grape known to me, and is still less like that of *Ampelopsis quinquefolia*, and approaches *V. cordifolia*. Last summer I found its leaves mined by a larva closely resembling that of *A. ampelopsifoliella*, *supra*, and which I suspect to be the same. I have never found it in the leaves of any other plant, though over a dozen other varieties of grapes grow within a few feet of the Longworth vine. From it I bred the species described below, which I do not now name, as it may prove to be identical with *A. ampelopsifoliella*. The single specimen was a little injured, and the description is therefore in one or two respects imperfect.

Palpi pale yellowish? Head and face bright but pale golden, in some lights silvery, tinged with golden. Antennae brown, *faintly* annulate with whitish. Thorax and primaries rich purplish brown, in some lights strongly purple or bronzed; before the middle of the primaries is a somewhat oblique fascia, which is silvery, or bright but pale golden according to the light, widest and nearer to the base of the wing on the dorsal margin, and not constricted on the fold; a silvery or pale bright golden spot on the dorsal margin, just before the ciliae, and a smaller costal one nearly opposite, *and a spot of the same hue at the apex*. Ciliae a little

paler than the wings, but I can not discover any hinder marginal line. *Al. ex.* $\frac{5}{16}$ inch.

The larva is white, without maculae, but with the anterior margin of the first segment brown.

A. hydrangæella. N. sp.

The mine and larva only of this species is known, and I have never succeeded in rearing the imago. The mine, larva and case resemble those of *A. viticordifoliella*, but are perhaps a little smaller. It mines the leaves of the wild *Hydrangea (H. nivea.)*

Dr. Clemens states that the species described by him mine the leaves of the various plants in the latter part of August and in September, from which I infer that he found them only at that time. But the mines of all the species may be found as early as the first of July, and in increasing numbers from that time until the fall of the leaves. I have reared *A. cornifoliella* in the latter part of July, from leaves gathered in that month, and have found the mines and larvae of all the other species, though I have only succeeded in rearing the other species in the spring from mines gathered in the fall.

NOTES ON THE "LIST" OF 1868.

BY AUG. R. GROTE,

Curator of Articulata, Buffalo Soc. of Natural Sciences.

Preparatory to a fresh edition of the "List of Lep.," of 1868, a few memoranda of the necessary changes will be published.

Sesia uniformis, p iii. This species is distinct from *thysbe*, and has been noticed by Mr. Lintner in his valuable "Entomological Contributions." Mr. Couper found it on Anticosti. This can not be *Sesia ruficaudis* Kirby, the description of which is given on p. 27 of the "Synonymical Catalogue" of 1865. Kirby says: two first segments of the body yellow olive, two next black, the rest ferruginous with yellow olive spots. *Uniformis* has the first segments yellow olive, the next deep ferruginous, the next again olive, and the anal hairs black, with ferruginous central tuft. In fact, Kirby's description rather resembles *diffinis* in the body parts. And from his comparison with *fuciformis*, we should think

at once of *diffinis*. But the terminal segments in *diffinis* are not "ferruginous" any more than in *uniformis*, and so Kirby may have had a boreal species we do not yet know before him. From his description there is no more correspondence with *uniformis* than with *thysbe;* rather does his description agree with *fuscicaudis* as to the abdomen terminally.

Cressonia juglandis, p. iv. To this species must be cited *Sm. pallens* of Mr. Strecker, whose figure represents a pale ♀ specimen of *C. juglandis*, without the median shade on the forewings. Belfrage has sent *C. juglandis* from Texas.

Dysodea || p. vi. This generic name is preoccupied and must give way to that of *Platythyris*. Mr. Walker's type of *Varnia* appears distinct. We have probably but one species which should be known as *Platythyris oculatana*. Boisduval's figure and description of *Vitrina* do not agree with our species, and probably *vitrina* represents *oculatana* in Europe. Much confusion has occurred through Dr. Clemens having described the species figured by us, Am. Lyc. Nat. Hist., N. Y., vol. viii, pl. 13, figs. 4–5, as one of the Tortricidæ, and without referring to Boisduval's original illustration of the genus. A second species is afterwards described by Dr. Clemens under the name of *Dysodia margaritana*, which I have never seen. Consult Am. Soc. Belge, T. 7, Pl. 1, for an illustration ot the embryonic stages of *Thyris*. They seem to correspond generally very well with Dr. Clemens' characters of the larva of *Dysodea*.

NOTES ON MEGACHILE CENTUNCULARIS.

BY THOS. G. GENTRY. GERMANTOWN, PA.

Since so much has been written upon the habits of our ordinary Leaf-cutting Bee, it would seem presumptuous for me to offer anything further in connection therewith. But a few facts which came to my notice recently are sufficiently interesting and important to merit publication.

During the latter part of June, 1873, several cells, a half a dozen in number, were sent to me by a friend, who had accidentally brought them to light while digging underneath the shade of a *Spiræa corymbosa*. They were found in close proximity to each other, arranged in a nearly horizontal position, at a depth of three inches below the surface of the

ground. The soil was comparatively solid. From the freshness of the leaves which composed the cells it would seem that the work had but lately been accomplished, but after the examination of a few, it was evident that some time had elapsed, since the larvae had attained to considerable dimensions.

The cells were nearly three-quarters of an inch in length, with a diameter of one-fourth of an inch. They were constructed of nearly perfect leaves of *Spiraea corymbosa*, instead of those of the various species of Rose. The outermost circle of leaves, three in number, had their margins slightly overlapping on the exterior, each piece forming an arc of a circle of 120 degrees. Within these were other three, arranged alternately with them; others, again, alternating with the latter, and so on until there were no less than six circles, having eighteen pieces in all. Each succeeding individual layer from without inwardly projected but slightly beyond its predecessor, having but a slight resemblance "to a long sleeve with folds upon it," as has been affirmed by writers. The mouth of each cell was closed by six circular pieces of leaves, nipped from the same plants. These were a trifle larger than the mouth of the cell, and when in position presented a concave surface facing outwardly. It is obvious that the whole structure is a striking proof of adaptation to an end. If the cell had been arranged vertically, its structure would doubtless have afforded water a ready access to the larva and its food, and thus have defeated the object which nature had in view. In the horizontal position the tile-like arrangement in the exterior, acts as a sort of roof by which the water is turned off. The concave arrangement of the circular pieces subserves a similar purpose. The freshness of the leaves was due, no doubt, to the protection which the enveloping earth afforded. The chemical rays of sunlight, which act upon the parenchymatous material of the leaf, when deprived of its vitality, converting the green and granular chlorophyl into others of a brownish hue, operate with less intensity at the depth of three inches. The comparative absence of moisture in the ground, no doubt, prevents oxidation; there being ample moisture at the same time to insure softness and prevent rigidity.

During the early part of last April (1874), several cells were brought to me by one of my pupils, which, on a superficial examination, appeared to be the mud cells of our ordinary *Pelopæus*, the mud-dauber. They were found adherent to the rafters of an unplastered attic. The cells were arranged side by side in numbers of three. On the exterior there

were no shallow grooves, denoting lines of demarcation. With this unimportant difference, the general outline of the mud mass, with its combination of pellets, was exactly similar to that constructed by the mud-dauber. Had the lines of separation existed, I should have had no hesitancy in characterizing it as a case either of usurpation of instinct upon the part of the *Megachile*, or one of confiscation of property.

Within, exposed to view by detachment from the aforesaid rafters, were what I supposed to be the leafy cells of *Megachile*. The length of these and the peculiar disposition of their parts, materially different from what I had always observed, operated upon my mind to such an extent that I was almost constrained to believe that I had met with something altogether new to science, or else that I had been fortunate enough to discover a species of *Pelopæus* with *Megachile*-like habits.

Each cell was one and one-eighth inches in length, with a diameter slightly exceeding one-fourth of an inch. It was built of elliptical pieces snipped from the leaves of a species of *Spiræa (S. corymbosa*, it seemed to me.) The pieces were of less dimensions than those before alluded to, and arranged somewhat on a similar plan, except that there was a strong appearance of a double cell, as if the inferior concavity of one cell had been deposited in the superior concavity or mouth of the other. This resemblance held true to a certain extent, but the absence of a clear line of division between the two seemed to militate against the idea of a double arrangement.

Having kept a few of the cells a reasonable length of time, until all hope of seeing insects emerge therefrom had vanished, I began the work of destruction by carefully pulling some of them to pieces. While engaged in my labor I was led to notice the comparative ease with which each relative structure separated in the middle. Within the aperture of one cell was a cylindrical pouch, composed of pure silk, glazed within by an oily secretion from the larva. This containsd a perfect, but dead bee, which was readily identified as *Megachile centuncularis*. The lower half of the same enclosed a similar silken sack, with fragments of legs, wings, antennæ and complete body segments, with a mass of debris which showed the clearest evidence of the ravages of some ruthless destroyer. Under a glass of moderate power, I had little difficulty in recognizing the fragments as parts of a *Megachile* similar to the above.

This last fact impressed me as peculiarly interesting and novel, as showing the economy which exists and is practiced among certain

individuals of this species. To construct the inner leafy cells, with their numerous parts, is a labor of little moment when contrasted with the hours that must be spent in moulding the clay for the outer side into small pellets, and then adjusting them to their proper positions. The existence of two bees in separate cases of silk, one above the other, in the same earthy apartment, seems to imply the existence of a double leafy cell, even though a partition between the two should be wanting.

It would appear that the deposition of one cell upon another would defeat the object which the mother *Megachile* had in view. On the supposition that oviposition in the upper cell took place subsequently to that in the lower, the time of leaving the egg would be earlier in the latter, the larva would sooner mature, and the perfect insect would be prepared to leave its prison-house anterior to its associate, and, being unable to effect its exit by reason of the narrowness of its domicile, would perish. This, doubtless, would be the upshot of the affair if similar cells in like situations should be built in the summer season. But as far as I have had any experience in the matter, the summer abodes of *Megachile* are single, a few inches below the surface of the ground, and generally under the shelter of some protecting shrub, where the warm rays of the sun can not effect any mischief. This site is doubtless well selected for the reasons above adduced.

There are usually two broods of this species in a season ; a summer brood, which makes its appearance early in July, and a spring brood which has survived the winter in its double cell of earth and leaves. It is possible that the larva, after having exhausted its stock of honey and pollen, its natural food early in the fall, passes into the condition of a pupa, and thus remains until awakened from its sleep by the genial warmth of spring.

In the cells designed for the winter accommodation of the species, the double arrangement of the inner cells will not materially affect the original purpose, since both insects will have passed through the cycle of transformations, and when the suitable time shall have arrived for their departure, the one occupying the upper cell will have made its way out and thus left a clear passage for the one below.

The absence of a line of separation between the two cells appears to indicate that the food had been deposited in the lower cell, and two eggs instead of one had been left in mistake. Where it is the custom of the insect to deposit but one egg, instinct teaches it to collect just enough

food to provide for the sustenance of the larva to which it gives birth; the two eggs in the present cases were deposited through some inadvertence upon the part of the insect, and it does not seem wise to conclude that a similar inadvertency had led to an accumulation of a double portion of food. If this double brood had been the result of mistake, it is not possible that several mistakes of a similar kind would have occurred, since it was my good fortune to meet with unoccupied cells that showed evidence of being once occupied.

If two eggs are deposited within the same cell, there must be collected a double quantity of pollen and honey for the nourishment of the larvæ. The one which attained to full growth first would, no doubt, seek a clear space in which to spin its covering, and this would be afforded by the upper part of the tube or upper cell. The other, after having made a sufficient space for this essential operation by the consumption of the remaining food, would accomplish the task therein.

Some cells, which it was my privilege to examine, exhibited faint tracings of a partition-like arrangement between them. A portion of the debris in the lower cell, to which reference has been previously made, may have been due to the comminution of the leaves forming the separating layers, through some cause or other. But this I am unable to substantiate. If such should prove to be the case by future observations, there is no doubt that there will be found to exist a separate accumulation of pollen and honey in each cell.

After a little reflection, there seems to be an offset to a portion of this argument. May it not be possible that after the two larvæ had matured into perfect insects, the more powerful one overcame the weaker, and that the fragments of wings, legs, body segments, &c., are the sad trophies of such a conflict? This point would be worthy of acceptance if every cell which was examined had betrayed similar evidences. But it was not the case. It only remains, then, to assume one of two opinions—either that the two ova were deposited upon a double allowance of food, so that the larvæ, when hatched, should find ample sustenance to reach maturity, and subsequently had constructed their silken cocoons in their respective positions, said positions being determined upon by priority of growth; or, that a double cell was built, one on the top of the other, each properly victualled and provided with an ovum.

STRAY NOTES ON CANADIAN DIPTERA.

BY BEVERLEY R. MORRIS, M. D., NOTTINGHAM, ENGLAND.

The following fragmentary notes are submitted to the readers of the CANADIAN ENTOMOLOGIST in the hope that they may assist in even a small measure in determining the numbers of this order occurring in the Dominion.

When in Canada I only incidentally captured Diptera, and the number I possess is very limited. I am indebted to F. Smith, Esq., of the British Museum, for the names of those given below. There are some other species as yet undetermined, and which on some future occasion I may succeed in getting named. The localities and dates given may be relied upon, as I numbered every insect taken, and recorded the date and locality at the time. I have included a few taken in New Hampshire and Maine, as it is probable they may also be found in Canada. Apologizing for the imperfection of the list, I send it in hope of assisting any one who may take up the Diptera of Canada. For the labels being lost off some I am indebted to the gross carelessness of one of our railways, over which the cabinet containing my insects was sent. I found great numbers loose, some ground to powder, others more or less injured, and many with the tickets shaken off. This prevents my being certatn of the localities, &c., in some cases, but I *believe* all were taken in or near Toronto.

Anthrax fuscipennis, Say.

I took this fly in considerable numbers on the carriage drive in front of the Rev. W. Ritchie's, at Georgina, on the 8th of August, 1863. They were hovering over holes in the gravel.

Anthrax analis, Say.

Taken at the same time and place, and along with the last. Habits the same.

Anthrax bastardi, Macq.

One was taken at Orillia in August, 1863. I also took one at Gorham, in New Hampshire, on August 19th, 1861.

Anthrax terminipennis, Say.

Labels lost, but taken, I believe, at Toronto.

Anthrax fulvina, Say.

Taken at Orilia the end of July, 1863; also at Cape Cottage, Portland, Maine, July 29th, 1861, and up to August 8th.

Stratiomis ischiaca, Harris.

At Cape Cottage, Portland, August 2nd, 1861.

Syritta proxima, Say.

Taken at Cape Cottage, Portland, on August 3rd, 1861.

Syrphus Ribesii, Fab.

Label lost, but I believe taken at Toronto.

Syrphus agnon, Walk.

At Toronto, in our garden, Nov. 10, 1861.

Eristalis inflexus, Walk.

Cape Cottage, Portland, July 22nd, 1961.

Eristalis sincerus, Harris.

At Toronto in 1860.

Eristalis nebulosus, Walk.

Label lost.

Conops sagittaria, Say.

Near Cape Cottage, Portland, July 24th, 1861. Two specimens.

Tachina finitima, Walk.

Cape Cottage, Portland, August 7th, 1861. Common.

Tachina apicifera, Walk.

College Avenue, Toronto, June 3rd, 1858. Cape Cottage, Portland, July 27th, 1861.

Tachina iterans, Walk.

Label lost. Probably Toronto.

——— ———? Sp.

At Orilia in August, 1863. Same size as *T. finitima*. Abdomen black, with a white spot at the side of each segment.

——— ———? Sp.

Bred from a chrysalis of some moth at Toronto, April 2nd, 1862. Rather smaller than the last species. Abdomen black, with somewhat obsolete white spots on side of each segment. Eyes reddish.

——— ———? Sp.

Somewhat like the last, but only half the size. Label lost.

——— ———? Sp.

Label lost. Same size as last. Wings iridescent; body black; eyes brownish red.

Chrysops carbonarius, Walk.

Taken at the Humber, Toronto, June 13th, 1863.

Asilus ——— ? Sp.

Cape Cottage, Portland, August 16th, 1861. A large species, measuring an inch and a quarter in length, and nearly an inch and a half in expanse of wings.

CORRESPONDENCE.

EXPLANATORY.

DEAR SIR,—

The following considerations have suggested themselves to me in reference to Mr. Herman Strecker's recent personal attacks. For myself I do not think that either Mr. Strecker's style or language can be defended on any ground. As to the matter, this is furnished by certain synonyms in my writings on North American moths. To those conversant with the subject, it is not necessary to point out the fewness of such mistakes, but it may have escaped notice that in nearly every instance I have been the first to correct the mistake, and thus Mr. Strecker's abuse has come *ex post facto* and proves itself wholly personal and unscientific. I take pleasure in referring here to words used in my earliest paper (Proc. Acad. Nat. Sci. Phil., 1862, p. 59). I think I have always lived up to my first statement, and where I have made a synonym, both "willingly and gladly" acknowledged it. And although I am charged by Mr. Strecker with allowing one mistake to remain "nineteen months" before correction, I can assure him that I still corrected it the moment I became aware that it existed. Certain of these mistakes have occurred in describing American species under distinct names. Sometimes these species have turned out to be the same with European forms, and a synonym has been the result. I do not think this the great misfortune which Mr. Strecker pretends, the less when we remember that in many instances the American specimens may be distinguished, and I have suggested that we shall lose a knowledge of these distinguishing points unless we use distinguishing names. Certainly these are occasions for quiet scientific observation, not in any case for unscientific vituperation. The difficulty of avoiding a giving of too great weight to a remote locality is even instanced by Mr. Strecker, who has re-described a ♀ *Cressonia juglandis* as a new species of *Smerinthus* from "Texas." The pale specimen, merely wanting the

median shade on the primaries, would, if caught, say in Reading, have hardly furnished one of Mr. Strecker's "coveted" novelties. Again, instances are on record where naturalists have first considered the American species the same as the European, and then changed their views and described them as distinct. An instance of this is offered by *Brephos infans*, first described as the same as the European *Brephos parthenias*. The amount of error is no greater in the one case than the other.

At the time that I commenced my labors, the difficulty of determining our species of moths was very great, certainly much greater than it is now. That this change is in part due to my work I think is true, equally so that Mr. Strecker is both unjust and ungrateful to omit the consideration from his mind. How much he himself is indebted to my labors may be seen by comparing my work on the genus *Catocala* with his own on the same subject. His figures and determinations are taken from the collection I studied and the paper I published; and, in reality, his figures merely supplement my original work. That Mr. Strecker has so generally coincided with me in his specific discriminations in the genus *Catocala*, is, I think, less a compliment to my correctness than a proof of Mr. Strecker's ready acceptance of assistance.

I have a few special remarks with which to conclude. I am blamed for retaining the name *C. ponderosa* instead of the earlier *C. nebulosa* || for a species of *Catocala*. From Linnæus to Lederer it has been customary to avoid the repetition of names in the same family of moths, and Guenée has changed the name of a species of *Catocala* on account of an *Anarta* bearing the same specific title. I have never changed the name of another author on this account; my opinion (as, indeed, cited by Mr. Strecker) being that a fresh name is unnecessary. I have merely, where two names were attached to the same species, preferred the later when the earlier had been previously used. Whether my descriptions in the genus *Catocala* are the best, I will not dispute with Mr. Strecker; in his comments on *C. ponderosa* Mr. Strecker forgets that we figured the species, in justice to Mr. Wiest, the artist, I think very acceptably. Nor will I allow Mr. Strecker the proper authority to discuss the value of structural characters in the Lepidoptera, seeing that he has shown no experience in the matter, and is unable to discriminate even between the sexes of *Catocala* when the abdomen is wanting.

A. R. Grote.

SYNONYMICAL NOTE.

Dr. Boisduval has recently re-described *Eudryas grata* (Fabr.) from Georgia under the name *Eudryas assimilis*, with the remark : Cette belle espece n'a pas encore ete figuree. It is manifestly unimportant to Dr. Boisduval that the science of Entomology is pursued in America. In this same paper (Revue et Magasin de Zoologie, 1874) the genus *Alypia* is erroneously attributed to Kirby, and a citation is given: "*Sphinx octomaculata* Hubn. Zut., 119, 120." which does not exist, the proper citation being "*Alypia octomaculalis* Hubn., Zutr., No. 60, fig. 119, 120."

Dr. Boisduval separates Drury's figure of *Urania rhipheus* (1773) from Cramer's (1782), under the new name of *Urania Druryi*. This is, however, a simple synonym in any event, since Drury's species must retain the name of *Rhipheus* as originally proposed. Cramer himself says, when describing his *Rhipheus*, T. 3, p. 193, "Ce beau Papillon et qui est tres rare, ressemble beaucoup a' celui qui a ete annonce par Mr. Drury dans ses Illustrations of Natural History, Vol. 2, pl. 23, figs. 1, 2, *sous le nom que nous lui donnons ci-dessus.*" Guenée, in 1857, also draws attention to this mistake of Dr. Boisduval's, then only proposed to be committed. It has been generally conceded that Drury's species is the same as Cramer's, and that the differences in the figures arose from an intentional mutilation of Drury's original specimen. Dr. Boisduval's quotation from Lacordaire would hardly cover such a case as this, in which a pair of scissors very probably effected "la creation." To find another "taille sur le meme patron," would argue, then, a lack of conscience somewhere, as well as the sacrifice of a specimen. But Dr. Boisduval insists on other characters to separate the two species than the absence of the tails, i. e., the large size and the ornamentation of the fore wings of *Rhipheus* Drury. So in this case we should have two species, i. e., *Chrysiridia Rhipheus* (Drury) nec Hubn. (= *Urania Druryi* Boisd.) and *Chrysiridia Orientalis* (Swains) (= *Rhipheus* Cramer 385, A. B.; *Chrysiridia Rhiphearia* Hübn.)

A. R. Grote.

Our usual acknowledgements of books received have been omitted for want of space, they will appear in our next.—Ed. C. E.

The Canadian Entomologist.

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ANNUAL ADDRESS OF THE PRESIDENT OF THE ENTOMOLOGICAL SOCIETY OF ONTARIO, 1874.

To the Members of the Entomological Society of Ontario :

GENTLEMEN,—I beg to offer you again, after the lapse of a year, my hearty congratulations upon the continued prosperity of our Society. As you have already learnt from the Report of our Secretary-Treasurer, we have been favored with a slight increase in our list of membership—as large, indeed, as can fairly be expected in a Society which confines itself to the study of a particular branch of Natural Science, and which cannot therefore attract into its ranks many who are not specially engaged, to some extent at least, in this limited field of investigation.

It is especially pleasing to find that our number of branches continues to increase—a highly successful one, with its headquarters in Montreal, having been organized since our last annual meeting. Its first annual report has been already presented to us in the pages of our journal.

The CANADIAN ENTOMOLOGIST, upon whose success the well-being and fair fame of our Society so largely depends, has—I am sure you will all agree with me—been more ably sustained than ever before. The thanks of the whole Society are assuredly due to the energetic and talented Editor, Mr. Saunders, who has been, indeed, its mainstay from the issue of its first number until now. It would be well if all our members would aid him, not only by contributions, but also by increasing the circulation, and thereby improving the means of support of the publication.

When I applied just now the term "limited" to our field of enquiry, I only did so when considering Entomology as one amongst a large number of sections of the great circle of natural sciences, which includes within its area the study of all things material which come within the range of man's intellectual powers. If we look, however, at Entomology and its objects alone, we cannot fail to see at once that it is practically

without limit—that there is work enough for thousands of investigators for almost innumerable generations to come. And when we couple with Entomology other kindred sciences, such as Botany, Geology and Physical Geography, which are so closely allied that no student can safely overlook them, we begin almost to be overwhelmed with the vast extent of this field of knowledge that we seek to explore. So vast, indeed, is the field that no one now ventures to survey the whole of it, except in a very general way; each explorer finds himself compelled—if he would do any effective work—to confine his labour to some one or two of its sections or subsections. By this division of labour, all departments of the Science will by degrees be taken up, and much that is now a '*terra incognita*' will become familiar to the patient explorer.

In our own country—within the bounds of this great Dominion—there is need of many more students and explorers. Even in this Province of Ontario, the headquarters of our Society, where more has been done than in any other part of Canada, there is yet room for a great increase to our band of collectors and investigators. How incomplete, for instance, is even yet our list of Diurnal Lepidoptera, and how many pages are still blank in the life history of some of our commonest butterflies? Our able Editor, my excellent friend, Mr. Saunders, has done much to fill up these blank pages, and his work is everywhere recognized as thorough and authoritative; but yet there remains much more to be done, that we hope our members will before long accomplish. If we turn to Crepuscular and Nocturnal Lepidoptera, we must feel almost appalled at the extent of our ignorance. For those who have the time and the ability, I can think of no more interesting or attractive field of enquiry—none that will sooner or better repay the pains-taking student, whether he looks for fame or pleasure, whether he sighs for fresh fields to conquer, or desires to set his foot where man has not trodden before. In a department where so much remains to be done, we all, I am sure, offer a most cordial welcome to one who has recently cast in his lot among us, and has traversed the broad Atlantic in order to study the Noctuidæ of this country. I allude to Mr. George Norman, of St. Catharines, late of Forres, in Scotland.

In another order of insects, the Coleoptera, much no doubt has been accomplished. Through the pains-taking labours of a Billings and a Pettit, not to mention other good workers, and by the aid of the great authorities in the neighbouring States, Dr. Leconte and Dr. Horn in particular, we have been able to increase our list of Canadian beetles from a few hundreds at the birth of the Society, to more than as many thousands

now. But still how very much more remains to be done? What a field of labour there is before both student and collector in the Carabidæ, the Staphylinidæ, the Curculionidæ and other numerous families of beetles! May we not hope that during the coming winter our present scattered stores of knowledge will be utilized and made available for the good of all, by the compilation and publication of a large addition to our old and valuable list of Canadian Coleoptera?

If there remains so much to be done in these two favorite orders, what shall I say of the remainder, that are so generally neglected? It is surely time that some of our members should devote themselves to the working up of such interesting orders as the Neuroptera, the Hymenoptera, the Orthoptera, the Hemiptera, even if no one can be found at present to take up the study of the more difficult Diptera.

In all these orders there is the nucleus of a collection in the cabinets of our Society, while no doubt much additional material would be furnished by individuals to any member who will take up in earnest the study of any one of them. It would be a great contribution to our knowledge of Canadian insects if there could be published by the Society carefully prepared lists of as many species as possible in each of these orders. Such lists would, of course, be very incomplete at first, but they could easily be so arranged in publication that additions might be made to them at any time, as our stores of knowledge increase.

Such, gentlemen, are some of the modes in which, I think, we should endeavour to extend the operations of our Society. If each year, when we assemble together for our annual meeting, we can point to some such work done in the previous twelvemonth, we shall have good reason to congratulate ourselves upon real permanent progress—upon building up the foundation of an Entomological structure that will prove enduring and substantial in time to come.

Thus far I have referred to Entomology as a purely scientific pursuit; there is another aspect in which we cannot refrain from regarding it, viz., as a subject of very great economic importance to every inhabitant of our land. This view of Entomology has been especially brought before us of late by the havoc that has been produced in our farms and gardens by hordes of destructive insects.

The dreaded Colorado Potato Beetle (*Doryphora decem-lineata*) has spread eastward with great rapidity, and has now reached the Atlantic coast in some parts of the United States. I have been informed by

friends who reside in various parts of the Union, that while little, if any, diminution in the numbers of the pest is to be observed in the west, it is becoming very destructive where it has attained to its second year of colonization. During the first year of its invasion of a particular locality, no appreciable damage is done by it, but as its armies increase in geometrical progression, the potato crops of the following season generally suffer to a terrible extent. It has now covered the whole of the Province of Ontario, and is very destructive throughout the western half of it, though we are happy to say that our intelligent farmers and gardeners are effectually using the remedies suggested by our colleagues, Messrs Saunders and Reed, in their Report to the Legislature a few years ago. In Quebec it is but beginning to be observed; no doubt it will be found there in myriads next year. Across the border, it has penetrated to the western portion of Vermont, into New Jersey, down to the sea coast in Pennsylvania, and in Maryland; at Baltimore, Md., it is very abundant, while straggling outposts have been found as far south as Washington. The whole of New York and Ohio have been pretty well covered with the insect, while in Missouri it is as abundant as ever. In Indiana and Michigan there is a local diminution in the numbers of the pest, but no where are there as yet any signs of its cessation. The people of Europe are now beginning—and with good reason—to feel alarmed at the prospect of its crossing the Atlantic. The English and French scientific and agricultural publications are commencing to publish notices of the insect and to talk of restrictive measures, while in Germany, we are told that stringent regulations will probably soon be put in force by the Government to prevent the invasion of the country. Unless some regulations of this kind are put in general force throughout the whole of Western Europe, I believe that—judging from the spread of noxious European insects on this side of the Atlantic—the Colorado Beetle will soon become there as familiar an object and as destructive a pest as it is here.

While the Colorado Beetle from the Rocky Mountains has been overspreading the whole northern continent eastward, there has been moving southward and westward in a similar manner another insect—the Cabbage Butterfly (*Pieris rapæ*)—that is almost as injurious as the other. This insect, an European importation, as of course you all know, starting from Quebec some few years ago—there first noticed by our friends, Messrs. Couper and Bowles—has now spread westward over almost the whole of Ontario. At Port Hope it has been this year by far the most common of all butterflies: thousands were to be seen throughout the whole

season, from early summer to the present time, flitting about along every road, and hundreds hovering over or alighting in every garden. There is hardly a cabbage or cauliflower fit to be eaten anywhere in the neighbourhood, while stocks and mignonette have been ruthlessly demolished in all the flower gardens. Its spread westward, however, has hardly been as rapid as its movements to the south. The two maritime provinces of New Brunswick and Nova Scotia, and all the New England States, have for some time been occupied, and now I am told that this year it is most plentiful as far south as Washington, and that it is by no means rare in Virginia.

While referring to the wonderful spread of noxious insects during the past few years, and to their excessive prevalence now, I must not omit to mention the affliction caused to our north-west Province of Manitoba and to many of the western States by the swarms of locusts, or grasshoppers as they are termed (*Caloptenus spretus*). The accounts of the sufferings caused by this terrible plague are perfectly appalling, and rival anything that we have read of the ravages of the Eastern locusts. Happily for us they do not seem to extend much further to the east than the Missouri River, though, occasionally they penetrate to some of the broad prairies beyond. As a detailed account of this insect will probably be afforded you in the forthcoming Annual Report of our Society, I need not detain you with any further remarks upon it.

The only other insect to which I need now call your attention for a moment, is the Grape-Vine *Phylloxera*. I am glad to learn that its ravages in the vineyards to the south of us have been comparatively trifling this year, and that in all probability the summer droughts to which we are so liable, will prevent its ever being as formidable a foe as was at one time apprehended.

To turn from this not very cheerful subject, I may mention, before concluding, that Mr. Saunders and myself duly attended the recent meeting at Hartford, Conn., of the American Association for the Advancement of Science. There we had the pleasure of meeting a large number of Entomologists from all parts of the United States, and we had the further gratification also, of being presided over, in general session, by the ablest of American Entomologists, Dr. Leconte, and in the Zoological Section, by another great worker in our department, Mr. S. H. Scudder. Informal meetings of Entomologists were frequently held, and finally it was agreed upon to form an Entomological Club of Members of the A.A.A.S., who should assemble annually a day before the meeting of the Association

in the place that may be from time to time selected for its sessions. In this way we trust that much may be done for the furtherance of our favourite branch of science, and that Entomologists generally, from all parts of the continent, will bring together their types of new species and the surplus of their collections for mutual information and benefit.

Without further trespassing upon your time and attention, I beg to thank you, gentlemen, for the kind consideration you have shown to my colleagues and myself during our term of office, and with hearty wishes for the continued prosperity of our Society,

I have the honour to be, gentlemen,

Your obedient servant,

CHARLES J. S. BETHUNE,

President E. S. of O.

Trinity College School, Port Hope, Sept. 22, 1874.

ON SOME CHANGES IN THE NOMENCLATURE OF NORTH AMERICAN COLEOPTERA, WHICH HAVE BEEN RECENTLY PROPOSED.

BY JOHN L. LECONTE, M. D., PHILADELPHIA.

Since the issue of the Check List of N. A. Coleoptera by the late Mr. G. R. Crotch, I have been asked by several persons interested in that branch of science, if I would advise them to change the labels in their collections in accordance with the nomenclature of several familiar genera as therein set forth. To all such applicants I have answered, that such changes are not expedient, unless they are fully convinced of the propriety of admitting them. For my part, I considered them quite unnecessary, and still further, contrary to the code of laws of nomenclature under which I supposed we were acting.

Circumstances, which it is unimportant for me to specify, have prevented me from heretofore making known the views upon which I formed the opinion thus given, but as confusion of ideas upon the adoption or non-adoption of Mr. Crotch's nomenclature now exists, I think that the time has now arrived for a full discussion of the subject.

For the purpose of confining attention to the more radical changes proposed, I will leave for a future time all questions relating to specific names, and consider at present only those affecting genera.

With the exception of some very unimportant examples, these chiefly turn upon the validity of the genera proposed and defined by Dr. Geoffroy in his Histoire Abregee des Insectes.

The first edition of this valuable work, in which, as is justly said by Mr. Crotch, he displayed "a degree of acumen far in advance of his age," bears date on the title page, 1764*, and was printed at Paris. The last edition, with supplements, was printed also in Paris, year of the Republic vii, (1799.)

The binominal nomenclature was first distinctly used in zoology in the 10th edition of the Systema Naturæ, by Linnæus, in 1758, and repeated in the 12th edition, 1766–67.

After the publication of the work last mentioned, Fabricius and others, devoting themselves more exclusively to entomology than Linnæus had done, divided his genera, and in describing new ones adopted other names for several of those described by Geoffroy.

The names of these later authors have, until the changes proposed by Mr. Crotch, been adopted without cavil.

Thus much as to the history of the question. Now as to the argument.

The most systematic attempt to reduce the laws of nomenclature in zoology to a code, capable of being easily understood and applied, was that of the British Association, acting through a committee, which reported at the meeting held in 1842.

Without discussing the details of this report, some of which might be and, indeed, were subjected to criticism, it is sufficient to state that the principles therein recommended were adopted by the Association, and without important modification, were reaffirmed by the Association of American Geologists and Naturalists at the meeting held in 1845.† These laws have been accepted and acted on by nearly all investigators in Natural History ever since.

Some discussions having taken place which indicated a possibility of improving the code, it was again referred by the British Association to

* Mr. Crotch states 1762, but I know not on what authority.

† Am. Journ., 2nd series, ii, 423—(1846).

a committee, which reported substantially the same rules, with a few closer definitions of moot points and some useful commentaries upon certain rules.

This report was adopted at the meeting in 1865, and was reprinted with notes by Prof. A. E. Verrill, in the American Journal of Science and Arts, 2nd ser., xlviii, 92, in 1869.

It would therefore appear that the common law under which Zoologists now act in questions of nomenclature, is the code, the history of which I have just given. The only other alternative is, that there are no established rules, and that in the Republic of Science each citizen is a judge, capable of expounding the law for himself, and amenable to no tribunal.

I will therefore assume that until a different code is formally adopted, American naturalists are disposed to abide by the recommendations of the two important scientific bodies, whose reports are above mentioned.

As the language of all three reports is equally clear and definite upon the points I wish to make against the reception of the Geoffroyan genera, I shall quote from the latest, reprinted in Silliman's Journal, 1869, as being most easy of reference.

"Rule III. The committee are of opinion, after much deliberation, that the XIIth edition of the Systema Naturae is that to which the limit of time should apply, viz., 1766".....(p. 94.)

P. 96. "As our subject matter is strictly confined to the *binomial system of nomenclature*, or that which indicates species by means of two Latin words, the one generic, the other specific, and as this invaluable method originated solely with Linnaeus, it is clear that as far as species are concerned, we ought not to attempt to carry back the principle of priority beyond the date of the 12th ed. of the Systema Naturae, 1766. Previous to that period, naturalists were wont to indicate species not by a name comprised in one word, but by a *definition* which occupied a sentence, the extreme verbosity of which method was productive of great inconvenience.".....(p. 97.) "The same reasons apply to genera.".... "Brisson, who was a contemporary of Linnaeus and acquainted with the Systema Naturae, defined and published certain genera of birds which are *additional* to those in the 12th edition of Linnaeus' works, and which are therefore of perfectly good authority. But Brisson still adhered to the old method of designating species by a sentence instead of a word, and therefore while we retain his defined genera, we do not extend the same indulgence to the titles of his species, even when the latter are accidentally binomial in form."

By reference to the several editions of Geoffroy it will be seen, 1st, that he did not adopt the binominal nomenclature, except in regard to the additional species described in the supplements to the edition of 1799*; 2nd, that he did not admit himself any rule of priority in generic names, inasmuch as he described genera previously proposed by Linnæus under other names, quoting Linnæus in synonymy; 3rd, that he made no reclamation either in genera or species, in the last edition of his work.

It must also be kept in mind that Olivier and Latreille, cotemporaries and friends of Geoffroy, used his generic names only so far as they did not conflict with the genera established by other authors up to the date of their respective memoirs. They did not therefore 'revive' these names, as claimed by Mr. Crotch, but adopted them and introduced them into the proper and permanent literature of scientific terminology, thus placing them upon a new basis.

It would therefore appear, that notwithstanding the great value of the work of Geoffroy, and the importance of the views of classification which he proposed (and none will be more ready to admit the merit of his labors than myself,) he did, by an unfortunate want of appreciation of the necessity of adopting the Linnæan binominal nomenclature, and by not recognizing the principle of priority, exclude himself from being cited *either for genus or species* under the existing code, except so far as relates to the supplemental species in the edition of 1799.

In all other instances the names of his genera are free, and must be attributed to the authors who subsequently employed and defined them, either *with* or *without* reference to his use of the names.

In order that the evidence upon which I have based my opinion may be readily accessible, I have appended the remarks of Mr. Crotch upon the priority of his names, and two tables, one of synonyms, the other of homonyms of all the Coleopterous genera defined by Geoffroy.

In conclusion, I would recommend to those who use the Check List to substitute for the generic names adopted from Geoffroy in that work, the following, which have been in current use:

P. 37.—*Peltis* Geoffr. to SILPHA Linn., and change *Silpha* to NECROPHORUS Fabr. Fabricius was the first to divide the Linnaean

* An abridgment of his work under the name of ——Fourcroy, with binominal nomenclature, was issued in 1785, and must be taken, therefore, as the earliest date for his species.

Silpha into two genera. The idea of type species, now commonly (though by no means universally adopted), did not then exist, and consequently it was competent for Fabricius to determine for which part of the genus he would retain the original name. If it was for the part corresponding with Geoffroy's *Peltis*, the latter must sink. Fabricius' *Necrophorus*, as will be seen in the table, is contained in *Dermestes* Geoffroy.

P. 42.—Change *Tritomidæ* to MYCETOPHAGIDÆ, and *Tritoma* to MYCETOPHAGUS Hellw., or else cite the name *Tritoma* from Fourcroy, 1785. The name in this sense should, in my opinion, be suppressed, as it was founded on a false character, and should not have been separated by Geoffroy from his *Dermestes*.

P. 79.—Change *Clerus* Geoffr. to TRICHODES Herbst., and *Thanasimus* Latr., so far as it relates to the 1st division of the genus, to CLERUS Fabr. Herbst first divided the genus as established by Geoffroy, and adopted by Fabricius, and therefore had the right to apportion the names to the divisions he founded.

P. 88.—*Stenocorus* Geoffr. The same reasoning would change this name to RHAGIUM Fabr.; the latter author having divided *Stenocorus*.

P. 51.—Change *Cistelidæ* to BYRRHIDÆ, and p. 52, *Cistela* to BYRRHUS Linn.

P. 93.—Change *Spermophagidæ* to BRUCHIDÆ, and *Mylabris* Geoffr. to BRUCHUS Linn.

P. 105.—Change *Tenebrionellus* Cr. to TENEBRIO Linn. *Tenebrio* Geoffr. is considered by Mr. Crotch to have *Asida* as its type, and therefore the change was proposed by him for the genus, as restricted by Fabricius, who first commenced its division into several genera. The same reason here applies as in several of the preceding instances.

P. 107.—Though not connected with the present subject, I may remark that the change of ULOMA to *Phaleria*, and of PHALERIA to *Halophalerus* Cr., has been produced by the assumption of generic types for the genera of authors who would certainly have repudiated the idea, had it been proposed to them. *Phaleria* Latr. was founded on three species, now belonging to different genera, and in course of time, and by the will of those who divided the genus, the 1st species has gone back to the previously established genus *Gnathocerus*, the 2nd became *Uloma* and the 3rd retained the name *Phaleria*.

P. 108.—Change *Pseudocistela* Cr. to CISTELA Fabr.

P. 115.—Cantharis *Linn.* should read *Geoffr.* The table of synonyms of Geoffroy's genera will show that by adhering to the received code of laws of nomenclature, the name CANTHARIS *Linn.* should be restored to some genus of Telephoridae which contains Linnaean species. Of these perhaps *Podabrus* would be the most convenient, while for the blistering flies, a dismemberment of *Meloe* Linn., the name proposed by Fabricius, LYTTA, must be adopted.

Remarks of Mr. Crotch on the Genera of Geoffroy, Trans. Ent. Soc. London, 1870, 43:

"1762. Geoffroy, in his Histoire Abregee, divides the Coleoptera into 50 genera, displaying a degree of acumen far in advance of his age, which was but little appreciated by his contemporaries; the ill-concealed jealousy of Linnaeus is only too evident in his 12th edition; Olivier and Latreille succeeded in restoring the majority of Geoffroy's names, but there are still several which must be adopted. . . . *Platycerus* and *Peltis*, often attributed to Geoffroy, must either be rejected as synonyms, or, if allowed to remain, be quoted from Latreille and Illiger, who revived them. The others ought to be all retained."

Table of Synonyms of Geoffroy's Genera.

1764.	1767.	1775.	1789.	1796–1806.
GEOFFROY.	LINNÆUS.	FABRICIUS.	OLIVIER.	LATREILLE.
1. Platycerus	Lucanus	Lucanus	Lucanus Trogossita	Lucanus Trogosita Platycerus
2. Ptilinus	Ptinus	Hispa	Ptilinus Drilus	Ptilinus Drilus
3. Scarabæus	Scarabaeus	Scarabaeus Cetonia Trichius Trox Melolontha	Scarabaeus Cetonia Trox Melolontha	Scarabaeus Cetonia Trichius Trox Melolontha Aphodius Geotrupes Oryctes Hoplia
4. Copris	Scarabaeus	Scarabaeus	Copris	Copris Ateuchus

1764.	1767.	1775.	1789.	1796–1806.
Geoffroy.	Linnæus.	Fabricius.	Olivier.	Latreille.
				Sisyphus
				Onthophagus
5. Attelabus	Hister	Hister	Hister	Hister
6. Dermestes	Dermestes	Dermestes	Dermestes	Dermestes
	Silpha	Necrophorus	Necrophorus	Necrophorus
		Tritoma	Ips	Ips
			Dryops	Dryops
		Sphaeridium	Sphaeridium	Sphaeridium
		Elophorus	Elophorus	Elophorus
		Nitidula	Nitidula	Nitidula
7. Byrrhus	Ptinus	Anobium	Anobium	Anobium
	Dermestes			
8. Anthrenus	Byrrhus	Anthrenus	Anthrenus	Anthrenus
9. Cistela	Byrrhus	Byrrhus	Byrrhus	Byrrhus
10. Peltis	Silpha	Silpha	Silpha	Silpha
				Choleva
11. Cucujus	Buprestis	Buprestis	Buprestis	Buprestis
12. Elater	Elater	Elater	Elater	Elater
				Throscus
13. Buprestis	Carabus	Carabus	Carabus	Carabus
	Cicindela	Cicindela	Cicindela	Cicindela
		Elaphrus	Elaphrus	Elaphrus
				Loricera
				Panagaeus
				Bembidium
				Harpalus
				Brachinus
				Lebia
14. Bruchus	Ptinus	Ptinus	Ptinus	Ptinus
				Gibbium
15. Lampyris	Lampyris	Lampyris	Lampyris	Lampyris
		Pyrochroa		
16. Cicindela	Cantharis	Cantharis	Telephorus	Telephorus
		Malachius	Malachius	Malachius
		Necydalis	Oedemera	Oedemera
				Dasytes
17. Omalysus			Omalisus	Omalisus
18. Hydrophilus	Dytiscus	Hydrophilus	Hydrophilus	Hydrophilus
19. Dyticus	Dytiscus	Dytiscus	Dytiscus	Dyticus
				Hyphydrus
				Haliplus
20. Gyrinus	Gyrinus	Gyrinus	Gyrinus	Gyrinus

1764.	1767.	1775.	1789.	1796–1806.
GEOFFROY.	LINNÆUS.	FABRICIUS.	OLIVIER.	LATREILLE.
21. Melolontha	Chrysomela	Cryptocephalus	Clytra	Clythra
22. Prionus	Cerambyx	Prionus	Prionus	Prionus
23. Cerambyx	Cerambyx	Cerambyx	Cerambyx	Cerambyx
24. Leptura	Leptura	Lamia	Necydalis	Lamia
	Cerambyx	Saperda	Saperda	Cerambyx
	Necydalis	Callidium	Callidium	Prionus
25. Stenocorus	Cerambyx	Stenocorus	Stenocorus	
	Leptura	Leptura	Leptura	Leptura
		Donacia	Donacia	Donacia
		Rhagium		
26. Luperus			Luperus	
27. Cryptocephalus	Chrysomela	Cryptoceph.	Cryptoceph.	Cryptoceph.
			Eumolpus	Eumolpus
28. Crioceris	Chrysomela	Crioceris	Crioceris	Crioceris
	Hispa	Hispa	Hispa	Orsodacna
29. Altica	Chrysomela	Altica	Altica	Altica
30. Galeruca	Chrysomela	Crioceris	Galeruca	Galeruca
31. Chrysomela	Chrysomela	Chrysomela	Chrysomela	Chrysomela
				Prasocuris
32. Mylabris	Bruchus	Bruchus	Bruchus	Bruchus
33. Rhinomacer	Attelabus	Attelabus	Attelabus	Attelabus
			Rhynchites	Rhynchites
			Apion	Apion
			Apoderus	
34. Curculio	Curculio	Curculio	Curculio	Curculio
				Calandra
				Brachyrhinus
				Lixus
				Cionus
35. Bostrichus	Dermestes	Bostrichus	Bostrichus	Bostrichus
				Anthribus
36. Clerus	Dermestes	Clerus	Clerus	Clerus
	Attelabus	Notoxus	Necrobia	Necrobia
		Dermestes		Thanasimus
				Opilus
				Anthribus
37. Anthribus	Dermestes	Curculio	Anthribus	Anthribus
		Bruchus	Macrocephalus	
38. Scolytus		Bostrichus	Scolytus	Scolytus
39. Cassida	Cassida	Cassida	Cassida	Cassida
40. Anaspis	Mordella		Mordella	Anaspis
41. Coccinella	Coccinella	Coccinella	Coccinella	Coccinella

1764.	1767.	1775.	1789.	1796–1806.
Geoffroy.	Linnæus.	Fabricius.	Olivier.	Latreille.
42. Tritoma	Chrysomela		Mycetophagus	Mycetophagus
43. Diaperis	Chrysomela	Chrysomela	Diaperis	Diaperis
44. Pyrochroa	Lampyris	Pyrochroa	Pyrochroa	Pyrochroa
	Cantharis			
45. Cantharis	Meloe	Lytta	Cantharis	Cantharis
	Necydalis	Necydalis	Oedemera	Oedemera
			Lagria	Lagria
				Sitaris
46. Tenebrio	Tenebrio	Tenebrio	Tenebrio	Tenebrio
	Silpha	Opatrum	Opatrum	Opatrum
		Blaps	Blaps	Blaps
		Helops	Helops	Helops
		Cistela	Cistela	Cistela
				Asida
				Pedinus
47. Mordella	Mordella	Mordella	Mordella	Mordella
			Cistela	Cistela
48. Notoxus	Meloe	Notoxus	Notoxus	Notoxus
49. Cerocoma	Meloe	Cerocoma	Cerocoma	Cerocoma
50. Staphylinus	Staphylinus	Staphylinus	Staphylinus	Staphylinus
		Paederus	Paederus	Paederus
		Oxyporus	Oxyporus	Oxyporus
51. Necydalis	Cantharis	Cantharis	Telephorus	Malthinus
52. Meloe	Meloe	Meloe	Meloe	Meloe

Notes to Table of Synonyms:

1, Trogosita *Fabr.;* 3, Geotrupes *Fabr.;* 4, Ateuchus Fabr.; 6, Lyctus *Fabr.;* Parnus *Fabr.;* Dryops *Latr.;* 7, Dermestes *Fabr.;* 13, Brachinus *Fabr., Weber;* 15, Lycus *Fabr.;* 16, Telephorus *Schæffer,* 1766; Dasytes *Fabr.;* 17, Omalysus *Fabr.;* 19, Hydrachna *Fabr.;* 21, Clytra *Laicharting,* 1781; 24, Prionus *Fabr.;* 26, Crioceris *Fabr.;* Ptinus *Fabr.,* 27, Eumolpus *Fabr.;* 28, Lema *Fabr.;* 29, adopted by Fabr. in Syst. Ent., 1775; transferred to Galleruca in Ent. Syst., 1792; some of the species also under Crioceris and Chrysomela; 30, Galleruca *Fabr.;* 32, the name Bruchus was adopted by Linnaeus from Kalm.; 34, Lixus and Calandra *Fabr.;* 35, Fabricius referred *capucinus* to Bostrichus in 1775, but in 1792 transferred it to Apate; 36, Clerus *Latr.*=Trichodes *Herbst, Fabr.;* 38, Eccoptogaster *Herbst.;* 40, Mordella *Fabr.;* 42, Ips *Fabr.*, Mycetophagus *Fabr.;* 43,

Diaperis, Hispa *Fabr.*: 45, Lagria *Fabr.*: 48, Notoxus *Fabr.*, 1782, Anthicus *Fabr.*, 1801 ; 50, several of Gravenhorst's genera, also adopted by Latreille.

These notes are not intended to give in all instances the authority by whom the additional names of genera were first proposed, but only to show their use by the authors quoted.

Table of Homonyms of Geoffroy's Genera, with their Reference to Modern Families :

1. Platycerus ; Lucanide. Lucanide (*Latr.*)
2. Ptilinus ; Ptinide. Ptinide (*Oliv., Latr.*)
3. Scarabaeus; Scarabaeide. Scarabaeide (*Linn., &c.*)
4. Copris ; Scarabaeide. Scarabaeide (*Oliv., Latr.*)
5. Attelabus ; Histeride. Curculionide (Linn., &c.)
6. Dermestes ; Dermestide. Dermestide (Linn., &c.)
7. Byrrhus ; Ptinide. Byrrhide (Linn., &c.)
8. Anthrenus ; Dermestide. Dermestide (*Fabr., Oliv., Latr.*)
9. Cistela ; Byrrhide. Cistelide (*Fabr., Oliv., Latr.*)
10. Peltis ; Silphide. Trogositide. (")
11. Cucujus ; Buprestide. Cucujide. (")
12. Elater ; Elateride. Elateride (*Linn.*, &c.)
13. Buprestis ; Carabide. Buprestide (*Linn., &c.*)
14. Bruchus ; Ptinide. Bruchide (*Linn, &c.*)
15. Lampyris ; Lampyride. Lampyride (*Linn., &c.*)
16. Cicindela ; Telephoride. Cicindelide (*Linn., &c.*)
17. Omalysus ; Lycide. Lycide (*Oliv., Latr.*)
18. Hydrophilus ; Hydrophilide. Hydrophilide (*Fabr., Oliv., Latr.*)
19. Dytiscus ; Dytiscide. Dytiscide (*Linn., &c.*)
20. Gyrinus ; Gyrinide. Gyrinide (*Linn. &c.*)
21. Melolontha ; Chrysomelide. Scarabaeide (*Fabr., Oliv., Latr.*)
22. Prionus ; Cerambycide. Cerambycide (*Fabr., Oliv., Latr.*)
23. Cerambyx ; Cerambycide. Cerambycide (*Linn., &c.*)
24. Leptura ; Cerambycide. Cerambycide (*Linn., &c.*)
25. Stenocorus ; Cerambycide. Cerambycide (*Fabr., Oliv., Latr.*)
26. Luperus ; Chrysomelide. Chrysomelide (*Oliv.*)
27. Cryptocephalus ; Chrysomelide. Chrysomelide (*Fabr., Oliv., Latr.*)

28. Crioceris ; Chrysomelide. Chrysomelide (*Fabr.*, *Oliv.*, *Latr.*)
29. Altica ; Chrysomelide. Chrysomelide (*Fabr.*, *Oliv.*, *Latr.*)
30. Galeruca ; Chrysomelide. Chrysomelide (*Oliv.*, *Latr.*, *Fabr.*)
31. Chrysomela ; Chrysomelide. Chrysomelide (*Linn.*, *&c.*)
32. Mylabris ; Bruchide. Meloide (*Fabr.*, *Oliv.*, *Latr.*)
33. Rhinomacer ; Attelabide. Rhinomaceride (*Latr.*)
34. Curculio ; Curculionide. Curculionide (*Linn.*, *&c.*)
35. Bostrichus ; Bostrichide. Bostrichide (*Oliv.*, *Latr.*) Scolytide (*Fabr.*)
36. Clerus ; Cleride. Cleride (*Fabr.*, *Oliv.*, *Latr.*)
37. Anthribus ; Anthribide. Anthribide, *Oliv.*, *Latr.*
38. Scolytus ; Scolytide. Scolytide (*Oliv.*, *Latr.*) Carabide, *Fabr.*
39. Cassida ; Chrysomelide. Chrysomelide (*Linn.*, *&c.*)
40. Anaspis ; Mordellide. Mordellide (*Latr.*)
41. Coccinella ; Coccinellide. Coccinellide (*Linn.*, *&c.*)
42. Tritoma ; Mycetophagide. Erotylide (*Fabr.*, *&c.*)
43. Diaperis ; Tenebrionide. Tenebrionide (*Oliv.*, *Latr.*)
44. Pyrochroa ; Pyrochroide. Pyrochroide (*Fabr.*, *Oliv.*, *Latr.*)
45. Cantharis ; Meloide. Meloide (*Oliv.*, *Latr.*) Telephoride (*Linn.*, *Fabr.*)
46. Tenebrio ; Tenebrionide. Tenebrionide (*Linn.*, *&c.*)
47. Mordella ; Mordellide. Mordellide (*Linn.*, *&c.*)
48. Notoxus ; Anthicide (*Fabr.*, *Oliv*, *Latr.*) Cleride, *Fabr.*
49. Cerocoma ; Meloide. Meloide (*Fabr.*, *Oliv.*, *Latr.*)
50. Staphylinus ; Staphylinide. Staphylinide (*Linn.*, *&c.*)
51. Necydalis ; Telephoride. Cerambycide (*Linn.*, *Oliv.*, *Fabr.*) Oedemeride (*Fabr.*)
52. Meloe ; Meloide. Meloide (*Linn.*, *&c.*)

DISCREPANCIES IN RECENT LISTS OF LEPIDOPTERA.

BY W. F. KIRBY, ENGLAND.

The opponents of the law of priority in nomenclature have taken occasion, both in England and America, to argue against the restoration of obsolete names, on the ground that the names employed in my Catalogue of Diurnal Lepidoptera do not always harmonize with those used in Staudinger's Catalogue of European Lepidoptera. Although this

argument looks plausible at first sight, a little reflection will probably convince many that it is baseless. We may leave genera out of the question now, as Staudinger has not attempted to grapple with the difficulties which they present; but as regards species, it must be remembered—1st, that Staudinger starts from 1758, instead of 1767, and that I should have done the same had I investigated the question fully when I commenced my work; and 2nd, that Staudinger, working at European Lepidoptera only, was necessarily better acquainted with the special literature relating to them than myself. Had I selected 1758, and possessed Werneburg's Beitrage zur Schmetterlings kunde at the time I was writing my own Catalogue, or had Staudinger's new Catalogue been published in time for me to verify the references contained in it, I think I may say that many of the alleged discrepancies would have disappeared, although, in some cases, I may have made use of materials which Staudinger does not appear to have employed, or may have seen reason to disagree with him as to the determination of certain species. Unless two authors have exactly the same materials to work with, or one copies from the other, no rules will be sufficient to insure their absolute agreement in *every* case; but by the strict law of priority, the chances of disagreement are reduced to a minimum.

MICRO-LEPIDOPTERA.

BY V. T. CHAMBERS, COVINGTON, KENTUCKY.

(Continued from page 170.)

ANTISPILA.

A. ampelopsisella. N. sp.

In the preceding paper on this genus I mentioned that I had found the larva of this species mining the leaves of *Ampelopsis quinquefolia.* Since that paper was placed in the hands of the Editor, many months ago, I have succeeded in rearing it from the mine.*

* The specimen mentioned in that paper as having been bred from the Longworth grape vine, is now too much denuded for satisfactory comparison with this species, but I believe it to be the same; certainly it is not any of the other known American species, and I have never met with it except in the Longworth grape leaf.

It is much smaller than any of the previously described species of this country, measuring only ⅜ of an inch *alar ex.*, whilst *cornifoliella* is larger ¼, *Isabella* a little larger still, and *Viticordifoliella* is scant ¼. But it differs still more decidedly by having an almost lunate, rather large snow-white streak extending along the base of the dorsal ciliae nearly to the apex.

The distinctions between the described American species are as follows: The fascia and dorsal spot in *isabella* are wider than in *cornifoliella*. *Isabella* has the palpi white and the anterior feet yellowish, with brown annulations. Dr. Clemens is in error when he says that it is without violet and greenish reflections; I find it shows them about as in *cornifoliella*. In all the species I should call the fascia silvery rather than golden, though it certainly is tinged with golden. *Isabella* has the antennæ brown, with faint purplish reflections in some lights; the basal joint is pale ochreous yellow, but the terminal joint is of the general hue. In *cornifoliella* the stalk appears a little darker, and the terminal joint is white. The head in *isabella* can scarcely be said to be golden, as Dr. Clemens describes it, but has metallic hues; it appears to be like the fascia, silvery tinged with golden, though in some lights it appears to be brown. I have not been able to detect any appreciable differences between the fore feet of these two species. The face of *cornifoliella* is more decidedly brown and less metallic than that of *isabella*, and the palpi are somewhat darker.

The most striking differences are in the size and form of the fascia. *Viticordifoliella* differs from both *isabella* and *cornifoliella* in the fascia, which, however, resembles that of *isabella*, except that it is narrower on the costa. The costal and dorsal white spots in *viticordifoliella* are much more nearly regular triangles than in the other two species, in which they approach the trapezoidal form, and the costal spot is relatively smaller than the dorsal and a little further back, but the most striking difference is that the wings of *viticordifoliella* are more of a dead brown hue, the violet and bronzy green reflections being much less distinct. Its anterior tarsi are silvery white, and the head and palpi silvery tinged with yellowish. *Ampelopsiella* has the palpi white; face and head silvery, the face with a blue tinge; antennæ dark purple brown, with the tip white; fascia much as in *cornifoliella*; costal and dorsal spots rather as in *viticordifoliella*, but its most distinguishing mark is the curved white spot or streak along the dorsal ciliæ.

ANNUAL MEETING OF THE ENTOMOLOGICAL SOCIETY OF ONTARIO.

The annual meeting of the above society was held (by the kind permission of the Provost) in the library of Trinity College, Toronto, on the 23rd of September, at 3 : 30, p. m. The report of the Secretary-Treasurer was presented, showing a slight increase of membership and a satisfactory condition of the finances, after which the President read his annual address, which was, by request of those present, kindly placed at the disposal of the Printing Committee for publication.

The following officers were then elected :—

President, Rev'd C. J. S. Bethune, M. A., Port Hope ; Vice-President, R. V. Rogers, Kingston ; Secretary-Treasurer, J. H. McMechan, London ; Council—E. Baynes Reed, W. Saunders, Rev'd G. M. Innes, J. M. Denton, London ; G. J. Bowles. Montreal. Editor of ENTOMOLOGIST, W. Saunders. Editing Committee—Rev'd C. J. S. Bethune, M. A.; E. Baynes Reed ; J. G. Bowles. Library Committee—W. Saunders, E. Baynes Reed, J. H. McMechan. Auditors—Chas. Chapman and J. H. Griffiths, London.

CORRESPONDENCE.

BRIEF NOTICE OF MR. STRECKER'S LAST ISSUE (NO. 10.)

The number bears the date of May, but its issue is certainly later, copies having been sent to subscribers in August ; its exact date is therefore uncertain. It contains brief descriptions of some supposed new species of moths, besides its curious account of North American Lycænæ, and pretty plate. The description of *Macroglossa fumosa* is in so far objectionable as Mr. Strecker is ignorant that all the allied species have, on emerging from the pupa, a light clothing of scales on the pellucid portion of the wings (see Ann. N. Y. Lyc., Vol. 8, and Lintner's N. Y. State Reports) which is easily brushed off.

Sphinx eremitoides is very probably *S. lugens* Walk.

Catocala magdalena is *C. illecta* Walk. (my No. 37).

Catocala aspasia is apparently *C. Arizonæ*, the description, so far as it goes, corresponding, with allowances for Mr. Strecker's "scarlet" hind wings.

A. R. GROTE.

PURCHASE OF INSECTS.—It often happens that an Entomologist is at a loss to procure specimens of certain rare species that he desires for purposes of study or to complete a series in his cabinet; he has seen them, perhaps, in the collection of a friend, or read of them in some publication, but is unable to obtain them for himself. We are glad to find that a provision has been made for such cases by the establishment of the "Philadelphia Agency" for the sale of specimens of insects; it is under the management of Mr. J. H. Ridings (518 South 13th Street,) and is evidently in close connection with the American Entomological Society. The Agency not only sells to purchasers, issuing price-lists of species from time to time, but also receives and disposes of collections from individuals upon commission. The names, moreover, of all insects sold by the Agency are guaranteed to be correct. We would recommend any of our friends who desire to procure rare and beautiful specimens, to send to the Agency for a price-list.

BOOKS RECEIVED.

On the Noctuidæ of North America, by Aug. R. Grote; from the 6th Report of the Peabody Academy of Science, Salem, Mass., 1874, pp. 18.

Descriptions of New North American Phalænidæ and Phyllopoda, by A. S. Packard, jr., ibid, pp. 19.

On the Transformations of the Common House Fly, with notes on allied forms, by A. S. Packard, jr. M. D.; from Proc Boston Soc. Nat. Hist., Feb., 1874, pp. 16, one plate.

Bulletin of the Buffalo Society of Nat. Sciences, Vol. ii, Nos. 1, 2 and 3.

Proceedings of the Boston Society of Natural History, vol. xvi, part iii, Jan. & Feb., part iv, Feb. to April, 1874.

Report of the Department of Agriculture, Washington, June to October.

Proceedings of the Convention of the American Association of Breeders of Short Horns.

Proceedings of the Academy of Natural Sciences of Philadelphia, October—December, 1873, and Jan., Feb. and March, 1874.

Report of the Council of the Agricultural and Arts Association of Ontario for 1873; Prize List of do for 1874.

Additions to the Library of the Linnaean Society, London, Eng., pp. 25.

The Observer of Nature, Lawrence, Kansas, vol. i, Nos. 1 and 2.

Entomology in Missouri, by Prof. C. V. Riley, from the American Naturalist, March and April, 1874 pp. 10.

The Zoologist and Newman's Entomologist, May to September; from Mr. Reeks.

Science Gossip to September.

Nature to Oct. 1.

The Horticulturist, N. Y., to Aug.

The American Agriculturist to July.

The Prairie Farmer, Chicago.

The Canada Farmer, Toronto, to July 15.

The Maine Farmer, Augusta, Me.

The Journal of Education, Toronto, to July.

The Indiana Farmer, Indianapolis.

Le Naturaliste Canadien, Quebec, to July.

Journal of Education to Sept., 1874.

LIBRARY, OF SCIENCES.

The Canadian Entomologist.

VOL. VI. LONDON, ONT., NOVEMBER, 1874. No. 11

ON ENTOMOLOGICAL NOMENCLATURE.

BY JOHN L. LECONTE, M. D., PHILADELPHIA.

Part I—On the Law of Priority.

Im Ganzen—haltet euch an Worte ! GOETHE.*

The discussions upon the subject of nomenclature in Zoology, and especially in the department of Entomology, have recently become very perplexing to American students. Many who have been unable either by want of time or lack of opportunity, to consult old works, which are to be found in but few libraries, are called upon suddenly to decide for themselves, whether they will or will not adopt changes in the names of some of the most familiar and best known objects.

To all such I have but two words of advice : *Resist innovation*, unless the innovator presents to you the reasons for his proposed change, with such force as to convince your judgment. Disregard the Mephistophelean counsel, in the motto above cited. Use the *words* only to acquire and convey accurately your knowledge of *things* : but never believe that the word is superior to the thing which it represents. Thus will you avoid scholasticism, one of the great abysses of thought into which the seeker after truth is liable to fall.

With a view to guide the thoughts of those of my readers who have paid heretofore but little attention to this very troublesome subject, in such manner that they may be able to form independent opinions, I have endeavored in this essay to place briefly before them the canons upon which all action in regard to nomenclature are at the present time supposed to be based. And to these canons I have appended short

* *On words* let your attention centre. B. Taylor's Faust, i, 110.

commentaries on the method in which I think they should be executed, in order that we may arrive at permanent and unchangeable results. These canons, as I would express them, are as follows :

1. The binominal system of nomenclature is the only one to be recognized : one word for the genus, and another for the species, to indicate each object.

2. Linnæus was the author of the binominal system.

3. The law of priority must be adhered to, so far as the interests of science make it practicable.

This law renders inviolable the name of every species which has been properly published, and the name of every genus properly defined and exemplified by one or more species.

4. The great number of the organic beings subjected to study has made it necessary, in order to avoid confusion, to increase the binominal name by adding the authority upon which the name either in whole or part rests.

5. In the formation of new names, reference is to be had to classical construction and to the ordinary proprieties of social intercourse.

Since the binominal system is of modern invention, being indeed scarcely more than a century old, and was only gradually introduced even by its author, it is obvious that none of these fundamental canons existed in the minds of the founders of Zoology, and that the appreciation of the necessity of such ordinances has become apparent only in consequence of the confusion occasioned by their non-existence.

The old codes of rules, Philosophia Botanica of Linnæus, and its imitation, Philosophia Entomologica of Fabricius, do not cover many of the most perplexing cases which have since arisen under these four rules, although, if acted on in good faith, they would have prevented much of the confusion since produced.

Concerning the two old codes I have at present nothing to say, the exhaustive commentary on the rules of Linnæus in the introduction to the Nomenclator Zoologicus of Agassiz, leaving, in fact, nothing to be desired.

It is therefore apparent that in applying the four canons, their influence must, like all retro-active laws, commence at certain arbitrary periods, to be determined, not by the judgment of individual investigators, but by

the same authority which fixes the principles themselves, that is : the common consent, expressed in a more or less formal manner, of the majority of those engaged in systematic study relating to the improvement of classification.

Now, the 1st and 2nd canons have been already put in execution by the rule adopted by the British Association, and reaffirmed by the Association of American Naturalists and Geologists, as follows :

" Rule III. The Committee are of opinion, after much deliberation, that the XIIth edition of the Systema Naturæ is that to which the limit of time should apply, viz., 1766."

This rule was adopted after much discussion regarding the respective claims of the 10th and the 12th edition to be considered as the basis of the system, and I think for wise and sufficient reasons. However that may be, there is no room now for individual difference of action ; it is a law, and must be obeyed by all good citizens in the Republic of Science, until modified or abrogated by an authority equal to that which enacted it.

The third canon respecting the law of priority is also formulated in several rules of the British and American code, but in such manner as to render its application somewhat difficult. The following considerations seem to me of sufficient importance to require a definite decision, when the next opportunity occurs for formal action.

1. It is obvious, on an examination of the works of the earlier authors in Entomology, that they did not attach the same value to the fixity of nomenclature that circumstances have since rendered necessary. Linnæus changed apparently without cause several of the specific names from the 10th to the 12th edition. Previous to that time, he used the generic names in different senses, in different editions, without any explanations. Geoffroy described genera without reference to genera previously established by Linnæus. Fabricius did the same with regard to Geoffroy, and also in some instances changed his genera from 1775 to 1787, without reason, or even reference to the earlier name.

It is not until we come to Olivier that we find in Entomology the law of priority appearing ; and not then as a matter of principle, so much as a courtesy due to the earlier describer.

I would therefore respectfully submit, 1st, that a rigorous application of the law of priority to those authors who did not act in accordance with it, will lead to much confusion : and it would probably be better, in all

doubtful cases, to restrict its operation to the time since the commencement of Olivier's part of the Encyclopedie Methodique, and to accept his decision as final on all cases up to that time, in the same way that the 12th edition of Linnæus is accepted as final on the question of binominal nomenclature.

2. If the authors anterior to the 12th edition are ruled out because of the imperfection of the binominal method up to that time, it would surely be consistent to exclude those after that time who failed to recognize its necessity. Species cannot, of course, be cited from them, for they gave no specific names; but I will go farther, and say that genera ought not to be attributed to them, except so far as to quote them in synonymy for their generic ideas, which were brought into harmony with the system of nomenclature by subsequent authors. They will live in the literature of the science in synonymy, but they have taken no part in the formation of the names of the objects, by which alone we know them and can speak of them, and therefore should not appear as authorities.

The proper application of the fourth canon is attended with still greater difficulty, and I fear that the two sets of opinions regarding the authority to be placed after the binominal name are absolutely irreconcilable. The arguments in favor of the original describer of the species on the one hand, and of the author of the binominal combination adopted on the other hand, are equally strong, perhaps, as regards the convenience of science, and each side has been argued with the utmost ability. I have therefore nothing to say on the subject in the way of argument, and suspect that for some time it must be left to the discretion of each student to decide under which system he can work best. Practically I do not regard it as a matter of any consequence, if each person will *distinctly declare* in his work *which system* he uses. The number of instances in which any confusion can result are few, and the synonymy in catalogues which are always at hand will at once resolve the doubt.

I may be permitted to observe, however, that clearer views of the respective merits of the two methods would prevail, and possibly even some harmonious result more speedily be obtained, if the arguments involved less discussion of purely personal interests. It would seem from some expressions of opinion I have seen, but which I forbear to refer to more definitely, that there are those that believe that one main object of descriptive natural history is to give the authors a sort of proprietary

interest in the species to which they affix names. The two methods of reference to authors would lead, therefore, on the one hand, to hasty and vague descriptions of species, on the other to arbitrary and unnecessary changes in genera. Such ideas are really aspersions on the motives of the great professors of unremunerative labor, upon whom science chiefly depends for her advancement. The good and true laborers are many; the small and mean minds, who feel honored at being quoted even in synonymy, are few. I think, therefore, that the harm to be done by adhering to either of the two methods is greatly exaggerated.

I would prefer to believe that the somewhat passionate line of argument occasionally indulged in, arises rather from a mental fault which is too common in this age, which prevails in all classes and in all pursuits —the undue importance given to the claiming of supposed rights, over the performance of fixed and definite duties. Of clamor for rights, even in countries where there is no oppressing class, we hear a great deal; of appeals for the rigid keeping of obligations we hear very little.

It is the privilege, with the facilities for publication now afforded by learned societies, of every careful observer of nature to contribute valuable material for the progress of the branch of science which he is capable of cultivating. *It is his duty* to put his contributions to knowledge in such a form as to be most easily available to his brothers in science. Whether his name remains connected permanently with his observation or not is a matter of small importance; he has done his duty in increasing the power of work of his colleagues.

In this connection I would observe that it is only in descriptive Natural History, the lowest and most routine work that a man of science has to perform, that any association of names with results is possible. In all other and higher departments of knowledge, such as Newton with gravitation, Young with light, Franklin with atmospheric electricity, Faraday, Henry, Arago, Ampere and Jacobi with dynamical electricity, Agassiz with glacial action; or, to exemplify from our own departments, Linnæus, Jussieu, Cuvier and Geoffroy, all these men are historically eminent for their labors, far more than for attaching their names to the objects of their study. With such examples of high and honest effort, to be imitated by us in proportion to our respective abilities, it is surely an ignoble ambition, and certainly an uncommon one, that would aim at distinction by having the name printed in association with a weed, or a bug, or a bone.

The multitude of new objects is the great curse of Natural History at the present time. When they are nearly all described and named, so

that they may be recognized, a period of more rapid and healthy progress will commence. The attention of the lovers of nature will then be free to observe the habits and to study more minutely the structure of the different species. Classification and economic science will advance together to the perfection which will reward the future students.

One more subject remains to be treated, and I have done. It is one that I approach with hesitation, and even with pain. The recommendations contained in the British American Code, for the future guidance of naturalists in respect to nomenclature, are carefully drawn, and if faithfully and prudently regarded, would leave nothing to be desired.

Unfortunately, under the influence of personal peculiarities, the excitement of political struggles, or the uncongeniality of religious associations, the contributors to scientific literature are sometimes led to forget the laws of good breeding, which are binding upon all civilized men, and should be particularly so upon those addicted to so noble a pursuit as the study of nature.

Under these exaltations of brain, names are sometimes proposed which are offensive* in the highest degree. It is useless to reason with such persons on the impropriety of their conduct, or the irrelevancy of proclaiming opinions which have no place in science, for their minds are occluded against all such appeals to their better nature. What shall be done with such names? It is a question which concerns not only the systematist, but every collector, every writer, indeed, who may have occasion to use an illustration from Natural History. I therefore invite the fullest and most democratic expression of opinion.

Insects and Flowers.—I have observed this spring that the bees extract honey from the flowers of the *Wisteria* by drilling a hole through the calyx. I have seen the big bumble-bees drilling the holes, and the honey-bees making use of these holes. Whether the latter have strength to bore the holes I am not sure; but it is curious that they should not treat the honeysuckle in the same way. It would be easier to pierce the corolla of that flower than the tough calyx of *Wisteria*, and it would yield a more abundant supply of nectar. No doubt there is some reason why they do not, and perhaps you can inform me what it is.—*C. T. in Science Gossip.*

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* [The author here evidently alludes to such names as Pleocoma Staff, Eudaemonia Jehovah and others of the same nature.]

ON THE INSECTS MORE PARTICULARLY ASSOCIATED WITH SARRACENIA VARIOLARIS *(Spotted Trumpet-Leaf.)**

BY CHAS. V. RILEY, ST. LOUIS, MO.

The insect-catching powers of those curious plants, the Fly-traps (*Dionæa*), the Sun-dews (*Drosera*) and the Trumpet-leaves (*Sarracenia*) have always attracted the attention of the curious, but renewed interest has been awakened in them by virtue of the interesting experiments and observations on their structure, habit and function, that have lately been recorded, and especially by the summing up of these observations in some charming papers by Prof. Asa Gray, which recently appeared in *The Nation* and *The New York Tribune*, under the title of "Insectivorous Plants."

Through the courtesy of Dr. J. H. Mellichamp, of Bluffton, and of H. W. Ravenel, of Aiken, S. C., who have sent me abundant material, I am able to submit the following notes of an entomological bearing, on the Spotted Trumpet-leaf (*Sarracenia variolaris*), which must henceforth rank with the plants of the other genera mentioned as a consummate insect catcher and devourer.

The leaf of Sarracenia is, briefly, a trumpet-shaped tube, with an arched lid, covering, more or less completely, the mouth. The inner surface, from the mouth to about midway down the funnel, is covered with a compact, decurved pubescence, which is perfectly smooth and velvety to the touch, especially as the finger passes downward. From midway it is beset with retrorse bristles, which gradually increase in size till within a short distance of the bottom, where they suddenly cease, and the surface is smooth. There are also similar bristles under the lid. Running up the front of the trumpet is a broad wing with a hardened or ventral side border, parting at the top and extending around the rim. Along this border, as Dr. Mellichamp discovered, but especially for a short distance inside the mouth, and less conspicuously inside the lid, there exude drops of a sweetened, viscid fluid, which, as the leaf matures, is replaced by a white, papery, tasteless, or but slightly sweetened sediment or efflorescence; while at the smooth bottom of the pitcher is secreted a limpid fluid possessing toxic or inebriating qualities.

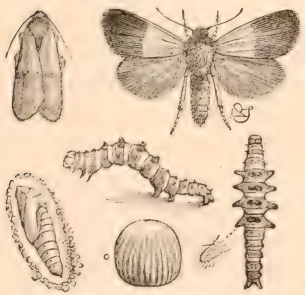
* Read before the American Association for the Advancement of Science, at the late meeting at Hartford.

The insects which meet their death in this fluid are numerous and of all orders. Ants are the principal victims, and the acidulous properties which their decomposing bodies give to the liquid doubtless render it all the more potent as a solvent. Scarcely any other Hymenoptera are found in the rotting mass, and it is an interesting fact that Dr. Mellichamp never found the little nectar-loving bee or other Mellifera about the plants. On one occasion only have I found in the pitcher the recognizable remains of a *Bombus*, and on one occasion only has he found the honey-bee captured. Species belonging to all the other orders are captured, and among the larger species that I have most commonly met with, which, from the toughness of their chitinous integument, resist disorganization and remain recognizable, may be mentioned *Asaphes memnonius* and *Euryomia melancholica* among Coleoptera, *Pentatoma lugens* and *Orsilochus variabilis*, var. *complicatus* among Heteroptera; while katydids, locusts, crickets, cockroaches, flies, moths, and even butterflies, and some Arachidna and Myriapoda, in a more or less irrecognizable condition, frequently help to swell the unsavory mass.

But while these insects are decoyed and macerated in order, as we may naturally infer, to help support the destroyer, there are, nevertheless, two species which are proof against its siren influences and which, in turn, oblige it either directly or indirectly to support them.

The first is *Xanthoptera semicrocea* Guen., a little glossy moth, which may be popularly called the Sarracenia moth. It is strikingly marked with gray-black and straw-yellow, the colors being sharply separated across the shoulders and the middle of the front wings. This little moth walks with perfect impunity over the inner surface of the pitcher, which proves so treacherous to so many other insects. It is frequently found in pairs within the pitchers soon after these open, in the early part of the season or about the end of April. The female lays her eggs singly, near the mouth of the pitcher, and the young larva, from the moment of hatching, spins for itself a carpet of silk, and very soon closes up the mouth by drawing the rims together and covering them with a delicate, gossamer-like web, which effectually debars all small outside intruders. It then frets the leaf

Fig. 25.

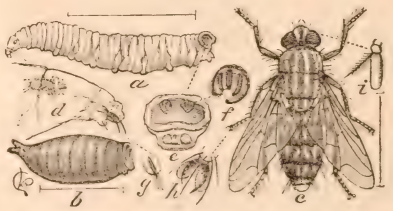


XANTHOPTERA SEMICROCEA.—*a*, egg, enlarged, the natural size indicated at side; *b*, *c*, larva, back and side views; *d*, chrysalis; *e*, moth, normal form, with wings expanded; *f*, pale variety, with wings closed.

within, commencing under the hood and feeding downward on the cellular tissue, leaving only the epidermis. As it proceeds, the lower part of the pitcher above the putrescent insect collection becomes packed with ochreous excrementitious droppings, and by the time the worm has attained its full size the pitcher above these droppings generally collapses. This worm, when full grown, is beautifully banded transversely with white and purple or lake red, which Dr. Mellichamp poetically likens in brightness to the Tyrian dye. It is furthermore characterized by rows of tubercles, which are especially prominent on the four larger legless joints. It is a half looper, having but six prolegs, and keeps up, in travelling, a constant, restless, wavering motion of the head and thoracic joints, recalling *paralysis agitans*. The chrysalis is formed in a very slight cocoon, usually just above or within the packed excrement. The species, kindly determined by Mr. A. R. Grote, was many years ago figured by Abbot, who found it feeding on *Sarracenia variolaris*, in Georgia. Guenée's descriptions were made from these figures, for which reason I have made some descriptive notes from the living material.* The species feeds alike on *S. variolaris* and *S. flava*, and there are at least two broods each year, the first brood of larvæ being found during the early part of May, the second toward the end of June, and disappearing with the dying of the leaves.

The second species is a still more invariable living accompaniment of both kinds of Sarracenia mentioned. By the time the whitish efflorescence shows around the mouth of the pitcher, the moist and macerated insect remains at the bottom will be found to almost invariably contain a single whitish, legless grub or "gentle," about as large round as a goosequill, tapering to the retractile head, which is furnished with two curved, black, sharp hooks, truncated and concave at the posterior end of the body.

Fig. 26.



SARCOPHAGA SARRACENIÆ.—*a*, larva; *b*, pupa; *c*, fly, the hair lines showing average natural lengths; *d*, enlarged head and first joint of larva, showing curved hooks, lower lip (*g*), and prothoracic spiracle; *e*, end of body of same, showing stigmata (*f*) and prolegs and vent; *h*, tarsal claws of fly with protecting pads; *i*, antenna of same. All enlarged.

This worm riots in the putrid insect remains, and when fed upon them to repletion, bores through the leaf just above the petiole and burrows

* These will be found in the Transactions of the St. Louis Academy of Science.

into the ground. Here it contracts to the pupa state, and in a few days issues as a large two-winged fly, which I have described (*loc. cit.*) as *Sarcophaga sarraceniæ*—the Sarracenia Flesh-fly.

The immense prolificacy of the flesh-flies, and the fact that the young are hatched in the ovaries of the parent before they are deposited by her on tainted meat and other decomposing or strong-smelling substances, have long been known to entomologists, as has also the rapid development of the species. The viviparous habit among the Muscidæ is far more common than is generally supposed, and I have even known it to occur with the common house-fly, which normally lays eggs. It is also possessed by some Œstridæ, as I have shown in treating of *Œstrus ovis*, the Sheep Bot-fly,*

But the propensity of the larvæ for killing one another, and their ability to adapt themselves to different conditions of food supply are not sufficiently appreciated. I have long since known, from extensive rearing of parasitic Tachinidæ, that when, as is often the case, a half dozen or more eggs are fastened to some caterpillar victim only large enough to nourish one to maturity, that they all hatch and commence upon their common prey, but that the weaker eventually succumb to the strongest and oldest one, which finds the juices of his less fortunate brethren as much to his taste as those of the victimized caterpillar. Or, again, that where the food supply is limited in quantity, as it often is and must be with insects whose larvæ are parasitic or sarcophagus, such larvae have a far greater power of adapting themselves to the conditions in which they find themselves placed, than have herbivorous species under like circumstances.

Both these characteristics are strongly illustrated in *Sarcophaga sarraceniæ*. Several larvae, and often upward of a dozen, are generally dropped by the parent fly within the pitcher; yet a fratricidal warfare is waged until usually but one matures, even where there appears macerated food enough for several. And if the Xanthoptera larva closes up the mouth of the pitcher ere a sufficient supply of insects have been captured to properly nourish it, this Sarcophaga larva will nevertheless undergo its transformations, though it sometimes has not strength enough to bore its way out, and the diminutive fly escapes from the puparium, only to find itself a prisoner unless deliverance comes in the rupture or perforation of the pitcher by the moth larva or by other means. This rupturing of the

* 1st Mo., Ent. Rep., p. 165.

pitcher does not unfrequently take place, for Dr. Mellichamp writes under date of June 27, as follows: "Most old leaves now examined—I might almost say all—instead of being bored, seem ripped or torn, as if by violence, apparently from without. You see occasionally shreds of the leaf hanging. Surely the legless larva of Sarcophaga cannot do this! What then—toads, or frogs, or crawfish abounding in these moist, pine lands? or rather is not the fat maggot the occasion of the visits of the quail, which lately I have observed here?"

These two insects are the only species of any size that can invade the death-dealing trap with impunity while the leaf is in full vigor, and the only other species which seem at home in the leaf are a minute pale mite belonging apparently to *Holothyrus* in the Gamasidæ, and which may quite commonly be found crawling within the pitcher; and a small Lepidopterous leaf-miner, which I have not succeeded in rearing. There must, however, be a fifth species, which effectually braves the dangers of the bottom of the pit, for the pupa of Sarcophaga is sometimes crowded with a little Chalcid parasite, the parent of which must have sought her victim while it was rioting there as larva.

No other insect, so far as we now know, can crawl up the slippery belt, but tumble into the tube and there meet their death.

Certain questions very naturally present themselves here: First, What gives the flesh-fly more secure foothold on the slippery pubescence than the common house-fly exhibits? Second, What enables the larva of the flesh-fly to withstand the solvent property of the fluid which destroys so many other insects? Third, What gives the Sarracenia moth and its larva similar security? I can only offer, in answer, the following suggestions: The last joint of the tarsus of the common house-fly has two movable, sharp-pointed claws, and a pair of pads or "pulvilli." These pads were formerly supposed to operate as suckers, and all sorts of sensational accounts of this wonderful sucker have been given by popular writers, who forgot that there are any number of minute insects having no such tarsal apparatus, which are equally indifferent to the laws of gravitation so far as walking on smooth, upright surfaces, or on the ceiling, is concerned. In reality, these pads are thickly beset on the lower surface with short hairs, most of which terminate in a minute expansion kept continually moist by an exuding fluid—a sort of perspiration. Take the soft human hand, moistened by perspiration or other means, and draw it, with slight pressure, first over a piece of glass or other highly-polished surface, and then over something that has a rougher surface, such as a

planed board, a papered wall, or a velvety fabric, and you will experience much greater adhesion to the smoother objects, and may understand the important part which these moist pads play in the locomotion of the fly. They also act, in part, like the cushions of a cat's paw in protecting and preventing abrasion of the claws, which are very useful on the rougher surfaces, where the pads are less serviceable.

Now, compared with *Musca domestica*, the claws of *Sarcophaga sarraceniæ* are much the longest and strongest, and the pads much the largest, presenting three or four times the surface. These differences are, I think, sufficient to explain the fact that while the common fly walks with slippery and unsteady gait on the smooth pubescence (the retrorse nature of this pubescence sufficiently explaining the downward tendency of the movement), its sarcophagus congener manages to get a more secure footing; for not only does the latter present a larger adhesive surface, but the longer claws are more likely to reach beyond the pubescence and the bristles, and fasten to the cellular tissue of the leaf beyond. Moreover, Sarcophaga is more thickly beset with stiff, spinous bristles than Musca, and Dr. Mellichamp says that when disturbed it buzzes violently about, just as if an animated sheep-bur had fallen into the tube—not apt to go down, because it will hitch and stick, and finally, by main force, it generally emerges, but once in a while also succumbs.

In answer to the second question I can only say that there is nothing exceptional in the power of the larva to withstand the solvent quality of the fluid; it is, on the contrary, in accordance with the facts known of many species of Muscidæ and Œstridæ, some of which, like the well-known horse bot, revel in a bath of chyme, while others are at ease in the intestinal heat of other warm-blooded animals. It is also well known that they will often live for hours in strong liquids, such as alcohol and turpentine.

In answer to the third question, the moth is doubtless assisted in walking within the tube by the spines and spurs on the legs, which it, in common with most other moths, possesses—the tarsi in Xanthoptera being armed with spines, and the spurs being quite long, and in *semicrocea* usually shod at tip with a corneous point. Its larva overcomes the treacherous surface by either carpeting it with silk or destroying it.

CONCLUSION.

To one accustomed to seek the why and wherefore of things, the inquiry very naturally arises as to whether Xanthoptera and Sarcophaga

play any necessary or important role in the economy of Sarracenia. Speaking of the Sarcophaga larva, Mr. Ravenel asks, "May he not do some service to Sarracenia as Pronuba does to Yucca?" And if so, may not all this structure for the destruction of insects be primarily for his benefit? Can he be merely an intruder, sharing the store of provision which the plant, by ingenious contrivance, has secured for itself, or is he a welcome inmate and profitable tenant? Self-fertilization does not take place in Sarracenia, and the possibility that the bristly flesh-fly aids in the important act of pollination, lends interest to the facts. No one has witnessed with greater pleasure than myself the impulse which Darwin has of late years given to such inquiries; but we should be cautious lest the speculative spirit impair our judgments or ability to read the simple lesson of the facts. My own conclusions summed up are:

First: There is no reason to doubt, but every reason to believe, since the observations of Dr. Mellichamp, that Sarracenia is a truly insectivorous plant, and that by its secretions and structure it is eminently fitted to capture its prey.

Second: That those insects most easily digested (if I may use the term), and most useful to the plant, are principally ants and small flies, which are lured to their graves by the honeyed path, and that most of the larger insects, which are not attracted by sweets, get in by accident and fall victims to the peculiar mechanical structure of the leaf.

Third: That the only benefit to the plant is from the liquid manure resulting from the putrescent captured insects.

[Mr. Ravenel, in making a transverse section near the base of the young leaf, noticed large tubular cells passing down through the petiole into the root, and much of the liquid manure may possibly pass through these into the root stalk.]

Fourth: That Sarcophaga is a mere intruder, the larva sponging on and sharing the food obtained by the plant, and the fly attracted thither by the strong odor, as it is to all putrescent animal matter or to other plants, like *Stapelia variegata*, which give forth a similar odor. There is nothing to prove that it has anything to do with pollination, and the only insect that Dr. Mellichamp has observed about the flowers with any frequency, is a Cetonid beetle—the *Euryomia melancholica*, which, with other species of its genus, is commonly found on many different flowers.

Fifth: That Xanthoptera has no other connection with the plant than that of a destroyer, though its greatest injury is done after the leaf has

performed its most important functions. Almost every plant has its peculiar insect enemy, and Sarracenia, with all its dangers to insect life generally, is no exception to the rule.

Sixth: That neither the moth nor the fly have any structure peculiar to them that enables them to brave the dangers of the plant, beyond what many other allied species possess.

PRELIMINARY CATALOGUE OF THE NOCTUIDÆ OF CALIFORNIA.

Part II.

BY AUG. R. GROTE,

Curator of Articulata, Buffalo Soc. of Natural Sciences.

10. Agrotis Cochranii Riley. (See ante p. 155).

The specimens are hardly to be distinguished from Eastern material; they are perhaps a little larger, and of a little different tone of color. My determination of this species as *lycarum* H.-S., based on a figure, is probably incorrect. It seems possible that Harris has described *A. Cochranii* under the name *messoria*, which should then be retained. More material of *A. fuscigerus* (ante No. 15) shows that this is a good but variable species, both in size and color. There is always a uniformity in the disposition of the ground tint over the primaries above, and usually the broad inner lunulations of the t. p. line and the median shade are characteristic. Some specimens have the hind wings of a pale yellowish testaceous, with double subterminal shade lines visible.

19. Dianthoecia niveiguttata (Grote). (Ante p. 156.)

In my ♀ specimen the ovipositor is apparently broken off.

28. Agrotis alternata Grote.

Mendocino, Mr. Behrens, June. Nos. 4 and 164. The California specimens vary in distinctness of the markings on the forewings as well as in the general color. One has the primaries entirely plain and unicolorus. I do not think there are grounds for suspecting a different species.

29. Agrotis innotabilis Grote, Proc. Ac. N. Sci., Phil., 1874.

Sauzalito, Mr. Behrens, August.

30. Dianthoecia pensilis Grote, Proc. Ac. N. Sci., Phil., 1874.

Sauzalito, Mr. Behrens, Aug., Sept. 11th, Nov., both sexes. Nos. 181 and 183, 123, 147. The specimens are less brightly gray than those from Victoria. The male has the primaries more uniformly broken up with reddish. The white shade above internal angle is indicated by the pallor of an angulation of the subterminal line.

31. Hadena arctica (Boisd.), Bull. B. S. N. S., 1, p. 42.

Sierra Nevada, Hy. Edwards, Esq., No. 3513.

32. Hadena Bridghami (G. & R.) l. c. p. 142.

Sierra Nevada, Hy. Edwards, Esq., No. 3510.

33. Hadena devastator (Brace.)

California, Hy. Edwards, Esq. Mr. Behrens, No. 193.

34. Hadena lateritia (Hubn.) This is *H. dubitans* Walk., of my 'List.

Sierra Nevada, Hy. Edwards, Esq., No. 3512.

35. Hadena genialis Grote, List N. Am. Noct., p. 66.

California, Mr. Behrens, Nos. 7 and 64.

36. Hadena castanea Grote, Bull. B. S. N. S., 2, p. 156.

California, Mr. Behrens, No. 10 (red label).

37. Hadena albina Grote, l. c. p. 157.

California, Mr. Behrens ; Sauzalito, May 15th, No. 78.

38. Hadena curvata Grote, l. c. p. 157.

California, Mr. Behrens, Nos. 70 and 99.

39. Hadena divesta Grote.

A moderate, slender bodied species, resembling somewhat in its colors *Dianthoecia pensilis*. Eyes naked ; abdomen strongly tufted dorsally. Fore wings dark gray, with the basal field shaded with carneous ochrey ; a patch above the submedian dash and extending between the spots, and the subterminal line shaded with the same color. There is a narrow black basal ray. Ordinary spots large and wide, concolorus, the blackish median shade marked on costal region between them. Median space wide, owing

to the outward removal of the t. p. line; the latter somewhat as in *H. curvata*, but much more removed beyond the reniform. T. p. line angulated opposite the cell, geminate, even in its course, its inner line forming a regular series of slight lunulations; the filling in of the line becomes white inferiorly. Subterminal line preceded medially by cuneiform black marks. Hind wings fuscous, darker outwardly, with a transverse shade line without the middle. Beneath fuscous, with even common line and discal spots.

Expanse 32 m. m. Sauzalito, Aug. 12th, Mr. James Behrens, No. 145.

40. Hadena marina Grote, List N. Am. Noct., p. 67.

California, Mr. Behrens, No. 68.

41. Hadena flava Grote, Trans. Am. Ent. Soc., 5.

Victoria, Mr. Crotch; Colorado, Mr. Mead.

42. Morrisonia peracuta Morr., Bull. B. S. N. S., 2, p. 114.

California?

43. Eupsephopaectes procinctus Grote, Bull. B. S. N. S., 1, p. 138, pl. 4, fig. 6.

California, Hy. Edwards, Esq., No. 73; Mr. Behrens.

44. Hydroecia nictitans var. *erythrostigma* (Haw.)

California, Mr. Behrens, July 30th, No. 165.

45. Ochria sauzalitæ Grote.

Sauzalito, September 17th, Mr. Behrens, No. 161; Hy. Edwards, Esq. No. 135.

This species has a distinct clypeal tubercle, and is therefore congeneric with the European *flavago*. It belongs to *Gortyna* of Lederer, but not of Hubner, whose genus is equivalent to *Hydrœcia* "B" of Lederer. For the European *flavago*, I have shown that *Ochria* Hubn. must be retained. I have separated *Hydrœcia* "A." of Lederer under Guenée's name, but I am of opinion that for this genus, of which the type is *nictitans*, the term *Apamea* must be retained. It is not a little singular that the species which most nearly resembles *flavago* in America, viz., *cataphracta* Grote, should have no clypeal tubercle, and therefore must be referred to a different genus. In my "List" I have erroneously referred *Gortyna purpurifascia*, an Eastern species without the tubercle, to *Ochria*, which, so far should only contain *O. sauzalitæ*. The Cal. species differs,

from *G. purpurifascia* by the t. p. line being slightly arcuate superiorly. In size and ornamentation the Californian species rather resembles *rutila*, which wants the tubercle.

46. Admetovis oxymorus Grote, Bul. B. S. N. S., 1, p. 133, pl. 4, fig. 5.
Sierra Nevada, Hy. Edwards, Esq., No. 2733.

47. Heliophila pallens [Linn].
California, Mr. Behrens, No. 10 [red label].

48. Heliophila phragmitidicola [Guenee].
Sauzalito, Sept. 25th, Mr. Behrens, No. 169.

49. Ufeus plicatus Grote, Proc. Bost. Soc. N. H., 16, p. 241.
California, No. 4414, Hy. Edwards, Esq.

50. Zosteropoda hirtipes Grote, List N. Am. Noct., p. 68.
California, Hy. Edwards, Esq., No. 3484.

MICRO-LEPIDOPTERA.

BY V. T. CHAMBERS, COVINGTON, KENTUCKY.

(Continued from page 198.)

ASPIDISCA.

A. diospyriella. N. sp.

This species was bred from minute mines in the leaves of Persimmon trees *(Diospyros virginiana)*, gathered in great abundance at the "Bee Spring" camp of the Kentucky Geological Survey, in Edmondson County, a few miles west of the Mammoth Cave. I have never met with it in Northern Kentucky, where the Persimmon tree also grows, but is comparatively rare.

Head and thorax, and a little more than the basal half of the primaries pale leaden gray, with a metallic, almost silvery lustre; antennae fuscous above, silvery fuscous below; just behind the middle of the wing are two

silvery streaks, one on the costal and one on the dorsal margin, the latter a very little before the former, and both strongly dark margined before and behind, their anterior dark margins meeting just behind the middle of the wing, where they are somewhat posteriorly angulated. The silvery streaks are not confluent, being separated by the anterior point of a dark brown dorsal patch, placed behind the dorsal streak. This dark brown dorsal patch is common to all species of the genus now known, and in all of them it forms the posterior margin of dorsal silvery streak, and becomes confluent with the posterior dark margin of the costal streak also ; the anterior dark margins of both silvery streaks are margined faintly before with pale golden, much less distinct and covering much less space than in *splendoriferella ;* behind the posterior dark margin of the costal streak is a small golden patch, as in *splendoriferella*, containing a small black dorsal streak (or, perhaps more correctly, margined by it.) In perfect fresh specimens of *splendoriferella* the extreme costa in this golden spot is always more or less streaked longitudinally with dark brown scales ; these dark brown streaks are absent in this species, and besides, in *splendoriferella* the anterior dark margins of the costal and dorsal silvery streaks are not confluent and posteriorly angulated as in this species, but are separated by a narrow golden line, which is carried backwards between the silvery streaks themselves, thus connecting the golden patch before the streaks with the costal golden spot behind the streaks ; in this species they are not so connected. Mr. Stainton, in a note on *splendoriferella,* in his edition of the Clemens papers, states that the silvery costal and dorsal streaks are confluent in that species. I have never found them so, but always under a good lens I find them separated by the narrow golden line as above stated. In *splendoriferella* the dark brown dorsal spot is separated from the fan-shaped apical spot by a narrow projection of the costal golden spot, which extends to a small spot of silvery scales on the dorsal edge of the apical spot; but in this species this golden projection is only represented by a small golden spot, which is separated from the costal golden one by a narrow blackish line, which extends from the brown dorsal spot to a small silvery spot at the beginning of the fan-shaped apical spot. As in all the other species, there is also a small silvery spot on the costal side of the fan-shaped apical brown patch, as well as one on the dorsal side, and the one at its beginning. The fan-shaped apical brown patch is traversed across its middle (between the two silvery spots) by a streak of paler brown, thus dividing it into two velvety black (rather than brown) spots. As in *splendoriferella*, there is a narrow brown

line from the apex of the wing to the apex of the ciliae, and as in that species, the ciliae are yellowish rather than yellowish brown, as Dr. Clemens describes them. Dr. Clemens' statement that in *splendoriferella* there is a black apical spot, with metallic scales, in its centre, also seems to me misleading; there is only the fan-shaped apical black spot divided across its centre by a paler brown streak, at each end of which is a minute speck of silvery scales, and there is the third one at the beginning or handle of the fan-shaped spot—and this is true of all the species. I have not been able to detect separate from the brown dorsal patch what Dr. Clemens calls "a blackish brown hinder marginal line in the ciliae" in *splendoriferella*, unless by it is meant the brown band which crosses the fan-shaped spot; but by careful observation with a lens, two such lines may be found in the dorsal brown patch, darker than the surrounding portions, but which I have not been able to detect in *diospyriella*. The basal portion of the wing is more silvery than in *splendoriferella*, and the apical portion is much less golden, so that in this species the dark brown and silvery hues prevail over the golden, while Dr. Clemens was perhaps right in calling golden the ground color of the apical part of the wing in *splendoriferella*.

In *juglandiella* the apical part of the wing is more golden than in *diospyriella*, but less so than in *splendoriferella*. It has, like *diospyriella*, the anterior dark margins of the two silvery streaks confluent, and the silvery streaks are separated in *juglandiella* as just described in *diospyriella* But, as in *splendoriferella*, the golden costal patch sends off towards the dorsal ciliae and *to* the little silver spot which on that side margins the fan-shaped spot, a short streak which is not cut off from the rest of the golden patch by a process from the costal brown spot to the fan-shaped spot, as we have seen is the case with *diospyriella*. The case of *juglandiella*, like that of *diospyriella*, is nearly oval, whilst that of *splendoriferella* is rather trapezoidal. But *juglandiella* is but little smaller than *splendoriferella*, whilst *diospyriella* is but little larger than *salicifoliella* Some of the points of difference that I have mentioned are only brought out by the use of the compound microscope.

Considering the near relationship of the food plants (Walnut and Hickory), it is strange that I have not sooner thought that *juglandiella* may be *lucifluella* Clem. It may be, though I have not been able to recognize it in Dr. Clemens' description. Indeed, it seems to me that *lucifluella* and *A. ella* are nearer to each other, though I have not been able to recognize *A. ella* in Dr. Clemens' description of *lucifluella*. I

am, however, satisfied that *A. ella* must either be *lucifluella* or the unknown species which mines *Ostrya* leaves. I have bred *ella* frequently from cases found adhering to various trees, but I have not been able to breed either the Hickory species (*lucifluella*) or the unknown *Ostrya* species. *A. ella* must be one of these, because the thoroughness of my search satisfies me that there are no other mines of this genus to be found in this region, except those of *splendoriferella* and *saliciella*, which are sufficiently distinct, and both of which I have bred. If *juglandiella* is *lucifluella*, then *ella* must be the *Ostrya* miner. *Splendoriferella* is decidedly the largest species that I have seen, but Dr. Clemens states that *lucifluella* is a little larger than it. This, however, is probably a mistake, as the cases that I have seen of *lucifluella* are even smaller than those of *splendoriferella*, and very greatly resemble those of *A. ella*, while also the vegetable hairs on the cases of *A. ella* appear to be identical with those on Hickory leaves.

The minute size of *diospyriella* is one of the strongest reasons for considering it a distinct species. *Al. ex.* $\frac{3}{8}$ inch.

MISCELLANEOUS.

Dryocampa rubicunda.—About four or five years ago I found a dead male specimen of this rare moth under an apple tree in our garden, and although a good deal rubbed, it was perfectly recognizable. This is, I am informed, the only instance of this moth having been taken in this city.—H. H. Lyman, Montreal, P. Q.

Dr. A. S. Packard, of Salem, Mass., is about to publish his long projected monograph of Geometrid moths, and designs giving a figure of each species. To make the work as complete as possible, specimens of this family are earnestly desired for study, and will be carefully returned, or other specimens sent in exchange.

Death of Francis Walker.—We have just received the sad intelligence of the death of this distinguished Entomologist, who died at his residence, Elm Hall, Wanstead, on the 5th of October. A more extended notice of him will appear in our next.

The Canadian Entomologist.

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THE LARVÆ OF DEPRESSARIA DUBITELLA AND GELECHIA RUBENSELLA.

BY MARY E. MURTFELDT, KIRKWOOD, MO.

Being much interested in the Tineidæ, Mr. Chambers' articles on this family of moths are the first to receive attention as the successive numbers of your magazine come to hand.

I have had the satisfaction of rearing from their larvæ many of the winged gems described in your pages, among others the two species named above. Now, as Mr. C. seems to have been in some doubt as to his own determination of these species, of which he has as yet—as he informs me—seen only the imagines, it occurs to me that a description of their larval characteristics might afford some aid in deciding the doubtful points.

The larva of *Depressaria (Gelechia) dubitella* Cham. is very characteristic and beautiful. It may be found during the months of July and August on *Ambrosia artemisiæfolia*, concealed in a fusiform case, which it constructs by drawing together the pinnatifid divisions of the leaf. I think it forms but a single case, which at first consists of but two divisions of the leaf drawn together with silken threads. As it increases in size, its domicile is enlarged by the incorporation of other lobes of the leaf. It is always to be found in its case in the daytime, and probably emerges only at night to feed.

This larva is rather more than half an inch in length, elongate and slightly flattened. Head horizontal, semi-elliptical, highly polished jet black. First segment horny, black and polished like the head. Second segment, anterior half *velvety* black, posterior half ivory white, ornamented above with five linear black marks, extending longitudinally backward; the dorsal and sub-dorsal ones do not reach to the posterior edge of the segment, while the lateral lines, above the stigmata, do. The remaining segments are of a translucent white color, varying from pearly to yellowish. They are marked with three faint, longitudinal, brown lines and with a few

minute, black, piliferous spots, each of which gives rise to a single, short, fine hair. Venter of the thoracic segments and thoracic legs black; prolegs and under surface of abdominal segments whitish. The change to pupa usually takes place within the larval case. Chrysalis slender, smooth, bright reddish brown, except the head and wing sheaths, which are much darker. Mr. Riley once brought me a leaf-folding larva on Hackberry, which resembled these Ambrosia case-makers in every respect, but as I did not succeed in obtaining the imago from it, I am unable to say whether or not the insects were identical.

In *my* specimens of *dubitella* the purple-brown of the anterior wings is marked with *four* ochreous spots, instead of *three*, as in Mr. Chambers' description, and the hind wings are more nearly gray than fuscous.

There is another leaf-folding larva of the same size and habit of *D. dubitella*, which also feeds on *Ambrosia artemisiæfolia*, and which is even more elegantly marked in black and white than the latter. This insect, which I take to be a true but undescribed Gelechia, I may, perhaps, describe in a future paper. I would respectfully propose for it the name of *Chambersella*.

The larva of *G. rubensella* is an external feeder on Oak. It inhabits a thin web at the base or near the tip of the leaf, and skeletonizes the upper surface of the latter. Its length is rather more than 3/8 of an inch. In form it is elongate and sub-cylindrical, tapering anteriorly and posteriorly from the middle, and has the sutures deep. The color is grass green, striped with numerous very fine longitudinal lines of purple, and ornamented with two sub-dorsal rows of conspicuous purple spots, situated at the sutures. Head horizontal, pale brown, pointed toward the jaws with two irregular whitish dashes on each side. Legs and prolegs pale green—the latter very narrow. This pretty larva is as characteristic in its habits as in its appearance. It does not touch the leaf except when feeding, but remains suspended in a sort of gallery of delicate web-work, through which it moves with surprising rapidity. It changes to pupa within a frail cocoon, on the surface of the ground. The chrysalis is pale brown, slender and chiefly characterized by long, free wing sheaths. The moth issues in about ten days. In its perfect state this insect bears so close a resemblance to *G. roseosuffusella* Clem., that it is difficult to distinguish it from the latter. It is, however, as a rule, smaller, darker and more roseate, while the larva is entirely different, that of *G. roseosuffusella* mining the leaves of Clover, and being much less strikingly marked.

ON ENTOMOLOGICAL NOMENCLATURE.

BY JOHN L. LECONTE, M. D., PHILADELPHIA.

Part II.—On Generic Types.

"Ignorato genere proprio, nulla descriptio, quamvis accurate tradita certum demonstret; sed plerumque fallat."—CÆSALP. apud Linn., Syst-Nat., xii, 1, 13.

In the first part of this essay I endeavored to show the confusion which resulted from the application of the law of priority to the names employed in the early development of our science by persons who had no idea corresponding to the law which has since been formulated. We will now attempt to discuss the second great fallacy in the exegesis of the writings of the founders of the science; the selection on principles, more or less arbitrary, but always opinionative, of generic types, when these *have not been explicitly* mentioned by the author.

With the more minute observation of differences in structure, and the consequent multiplication of genera, has arisen an idea that all classification, generic and otherwise, is simply a human contrivance for the purpose of expressing degrees of resemblance between the organic forms which we collect and recognize as distinct.

In short, that our best efforts to ascertain the relations of organic beings has resulted, not in a system, but in a dictionary.

This was not the idea of the fathers in science—nor is it the idea of many respectable students of the present day.

The language of Linnæus is clear upon this subject. 'Genus et species naturæ opus;' to him and to his followers there was no generic type. Each species comprised in the genus was equally typical, unless, as in rare cases, it was mentioned as aberrant, with a suspicion expressed in some instances that it would be subsequently separated as a distinct genus. When dissections were made, as in the fuller definitions in the foot notes in the works of Fabricius, it was not because the dissected species were selected peculiarly as the type of the genus (for in many instances the dissections are not part of the generic formula), but merely that the most common and available species was chosen for the purpose of giving more information than was conveyed by the condensed generic diagnosis.

In the gradual progress of science, and with the multiplication of genera, it came to be considered that the person who recognized the necessity of subdividing an ancient genus, should exercise his judgment regarding the part to which the old name should adhere ; and in most instances this was attended with no inconvenience.

Rarely, as in the case of TEMNOCHILA *Wm.*, the name of the original genus TROGOSSITA was retained for a group which did not accord with the original definition ; the new name was imposed upon the set of species which should have kept the original name. These instances are but few in number, and the exposure of the error committed is sufficient to cause its immediate correction.

I would therefore infer that the practice of some students in recent times, of applying the older generic names in a different sense from that in which they were restricted by the persons first making the divisions, is founded upon an incorrect interpretation of what was formerly meant by a genus ; and that these old authors, were they now alive, would strongly resist the limitation of their generic idea to a single type-species.

When the describer of a genus establishes the genus upon a single species, either because it is the only one known to him, or because, as is sometimes the case, he does not choose to enumerate the others, then of course, from the accident of the case, that particular species becomes typical of the genus, and must remain so as long as the present system of nomenclature is adopted. But when, on the other hand, several species are included in the genus, and they all agree accurately in the possession of the *characters mentioned* as defining the genus, they must in my opinion be regarded as *equally typical*. It would save much confusion in interpreting the modern use made of these restricted older names, if in all instances in systematic works the restricting authority was added in parenthesis.

A more difficult source of confusion is that resulting from the erroneous position ascribed to a genus, which renders it, with the ordinary usages of interpretation, absolutely irrecognizable ; as when, for instance, the Byrrhide genus AMPHYCYRTA was described by Mannerheim as a Tenebrionide, under the name Eucyphus, and the genus AMPHIZOA also as a Tenebrionide (Dysmathes). In these two cases Mannerheim's names fail from want of priority, but had this not been the case, I still maintain that the names of erroneous position should be suppressed in favor of later names which may have been independently given, and correctly

defined. The genus being erroneously described, of course fails to represent any idea realized in nature, and the specific name must therefore fall with it, and the whole name be quoted in synonymy, with the error mark (‡) appended.

While I fully recognize the importance of having the same object always spoken of by the same name, I must frankly say that the forced uniformity aimed at by somewhat arbitrary processes, in a few familiar instances, seems to be capable of producing still greater confusion. To take an example: our common tumble-bug is equally known to most students of entomology as CANTHON or COPROBIUS, and specifically as *lævis* or *volvens*, the first generic and specific names having priority. Recently, however, on the authority of Gemminger and Harold, and of Mr. Crotch, the specific name *hudsonias* has been resurrected from Forster's Centuria Insectorum. The priority of this last name is not borne out by any evidence in the books containing the descriptions, and if it be valid, can only be demonstrated by careful bibliographical investigation of a collateral kind. It is unreasonable to expect that our familiar names for common objects, for it is only among them that such changes are likely to be suggested, should thus be altered where there can be any excuse for resisting the innovation. But I will go farther and say, that where two names have become from peculiar circumstances equally known, there can be no serious objection to the writer using that one for which he has preference. If I had occasion to write concerning the great Aristotle, it is certain that all those persons capable of understanding what I would desire to say about him, whether I mentioned him by his name or spoke of him as the Stagyrite, or even as the Preceptor of Alexander, would know who was meant.

When the different names which have been applied to the most common species, have been recognized by competent authorities as synonyms, and have been thus collated in accessible registers, catalogues or systematic works, it is not a subject worth contention which of these equally known names may be used by individual writers. Certainly it is wrong for a person, without a careful study of bibliography, to change his habit in the use of a name, because the latest authority advocates a subversion. It is by no means true in natural history that the latest is the best, and those who are not critical students in these subjects will do well to follow the advice given in the first part of this essay, to *resist innovation*,* until they find

* Confusis enim nominibus omnia confundi necesse est.—CÆSALP. apud Linn., Syst. Nat. xii, i, 13..

that the later views are adopted by those to whom they have a right to look for instruction upon these technical points. Let them, at any rate, be clear in their minds that the changes are in accordance with the existing laws, or let them agitate for such alteration in the current code as will produce legally the modifications they desire.

Other special cases may arise of still greater difficulty than those I have here discussed. For the proper solution of these, I think the suggestion of Mr. Alfred Wallace* is most valuable. It is that all disputed points in nomenclature should be referred for investigation and decision to a committee of experts. Such a committee could be readily formed in the Entomological Club of the American Association for the Advancement of Science, which would dispassionately determine all questions relating to the progress of the science in North America, and announce their decisions each year. These decisions would, I am convinced, be cheerfully adopted by most, if not all of those who are occupied in the study of the insects of this continent.

One more suggestion in conclusion. It is this: That in proportion as the objects become well known, and especially in those species which fortunately possess no synonymy, all reference to authorities should be dropped, except when *bibliographical reference* to a full description or figure is necessary. If, however, a synonym must be mentioned, let the author of this supplementary name be quoted.

Should this suggestion be adopted, it will result that the name of the describer will not be unnecessarily connected with the valid name of the species, and one strong support of the small personal vanity which I have criticized in the first part of this essay will be destroyed. Another important result will be that the maker of a synonym will know that his name will be inseparably connected with that synonym, whenever it is mentioned; and that, therefore, so far from being an honor, or a recognition of good work, the use of an authority will come to be known as an indication of bad or imperfect work, and the makers of species on hasty study or on defective materials will be discountenanced.

* Address of the President, Trans. Ent. Soc. London, 1871, lxviii.

ON SOME OF OUR COMMON INSECTS.

No. 15. THE IO MOTH—Saturnia (Hyperchiria) Io. Fabr.

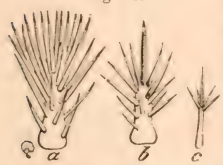
BY E. B. REED, LONDON, ONT.

This lovely moth is well worthy a place in the cabinet of the collector, and is always sure to attract notice and admiration. The larva, of which fig. 27 represents a full-grown specimen, is of a most delicate apple or pea green colour, with a broad, dusky white stripe at each side, bordered with lilac on the lower edge. The body is covered with clusters of green bristles, tipped with black. These bristles are exceedingly sharp, and when the insect is handled, will produce a very irritating sting, similar to, but much sharper than that of the nettle, and the effect of which causes a reddening of the flesh and the immediate appearance of raised white blotches, which last for a considerable time.

Fig. 27.

Fig. 28 shows the appearance of these bristles, some of them, as *b*, being stouter and more acute than the others, and able to inflict a sharper and more penetrating sting. According to Mr. Riley, the irritating property belongs to the substance of which the spines are formed, and his opinion was strengthened by the fact that the spines of a cast off skin, which had been in his cabinet for years, still retained the irritating power.

Fig. 28.



In the earlier stages the caterpillars are gregarious, feeding together side by side, and in going to and returning from their place of shelter, moving in regular files, like the processionary caterpillars of Europe (*Lasiocampa processionea*). When about half grown they

disperse, each seeking a location for itself. They moult five times, devouring their cast off spinous skins. After being in the larval state about eight weeks, they arrive at maturity, and are then about two inches and a half long.

Their food plants are numerous. They have been found on Black Locust, Indian Corn, Willows, Sassafras, Wild Cherry, Elm, Hop-vine, Balsam, Balm of Gilead, Dogwood, Choke Cherry, Currant, Cotton and Clover. I, myself, this year found it on the English Filbert, and raised it to maturity on that plant. I have, however, more commonly found it on the Choke Cherry. The larva, when full grown, crawls to the ground, where, amid the loose leaves and rubbish, it forms a rough covering, within which it makes a slight cocoon of tough, gummy, brown silk. In this retreat a change is soon effected to the pupal or chrysalis state, and having remained therein during the winter and spring months, the moth emerges in the perfect winged state about June. The moths are especially remarkable for the difference between the sexes, both in size and colour.

The male, fig. 29, which is much the smallest, is of a deep Indian or maize yellow; on the fore wings are two oblique, wavy lines, near the hind margin, and a zigzag line near the base. There is also a large, dark, reddish, central reniform spot or blotch. The hind wings are broadly shaded with purple, next to the body; on the hinder margin is a purplish curved band, and within this again is a smaller one of a dark purple or violet colour. In the centre of this last band and the middle of the wing is a large, round, blue spot, with a whitish centre and a broad border almost black; the under side of the wings is of the same deep yellow; the fore wings showing the same dark occellated spot, as on the other side, and having the inner margin broadly shaded with purple. The hinder wings are more uniform in color, with a transverse purple line and a very small, distinct white spot representing the centre of the large spot on the upper side.

Fig. 29.

The body is also deep yellow.

The female, fig. 30, is considerably larger; the specimens vary very much in color, from a dark purplish brown to a warm ochreous red. The fore wings have similar wavy, zigzag lines; the reniform blotch being less distinct than in the male; the inner margin is of a deeper colour, and is

Fig. 30.

thickly coated with short hair, like the head and thorax. The hind wings are similar to those of the male; the under side has the same uniform colour, and the markings and spots as in the male.

The body is the same shade as the wings, the abdomen being a little lighter in colour, and each segment being bordered with a narrow reddish band.

The moths vary in size from two and a half inches in the male to three and a half in the female.

The eggs are deposited on the under side of the leaf, and are described by Mr. Riley as being compressed on both sides and flattened at the apex, the attached end smallest, in colour cream white, with a small black spot on the apical end and a larger orange one on the sides.

TINEINA FROM TEXAS.

BY V. T. CHAMBERS, COVINGTON, KENTUCKY.

A collection of Tineina received from Mr. Belfrage, of Waco, Texas, presents some points worthy of mention apart from the descriptions of the new species.

The collection consists of about two hundred and fifty specimens in tolerably good condition, referable to seventy-six species and twenty-seven genera. Such a number of genera and species is evidently typical of the

Tineina of the locality where they were collected. Twenty-nine of these species belong to the genus *Gelechia*, and twenty-five others belong in the same family. Fifty-three of these species thus belong to the *Gelechidæ*, and only twenty three to other genera. The *Gelechidæ* are numerous everywhere, and a preponderance of species belonging to this family is to be expected in almost any collection, but I have not known any other collection in which it was so great as in this one.

The collection contains seven species of *Laverna*, and another species which I have made the type of a new genus very nearly allied to *Laverna*. These seven species differ from each other somewhat as to the neuration, and also as to the raised tufts on the wings, but perhaps not to any greater degree than do well recognized species of *Laverna*, as e. g. *L. Staintoni* and *L. langiella* of Europe. Mr. Stainton *(Nat. Hist. Tin., vii)* enumerates only twenty species belonging to this genus, and three others are also known from this country. This collection then contains nearly one-third as many species of this genus as were heretofore known altogether. Of the species heretofore known, but one (if I rightly understand Mr. Stainton) is fairly described as white, that being the prevailing or ground color, though some others have more or less white markings. But of these seven, five may fairly be placed in the white section ; and the other two are also strongly marked with white.

The collection contains five species which I have placed in *Butalis*, though with great doubt as to two of them, which are totally unlike all other species of the genus in color, though I have not been able to discover any structural differences whatever.

But it is, perhaps, more remarkable for what it does not than for what it does contain. As before stated, such a collection is typical of the Tineina of the locality where it was collected. ' Yet it contains no specimen of *Lithocolletis*, which, both in the collections of Dr. Clemens and myself, is the genus next most numerous in species and individuals after *Gelechia*. *Tinea*, *Coleophora*, *Gracilaria*, *Bucculatrix*, *Tischeria* and *Nepticula* are also genera usually numerous in species and individuals. Yet this collection contains only one *Tinea*, two *Coleophora*, no *Gracilaria* (unless a single species of *Coriscium* be held to represent it), and three ? species of *Bucculatrix*, one of which is a somewhat aberrant form.

All of the species are new except ten. These are as follows :

Gelechia cercerisella Cham.,
" *æquæpulvella* "
Ypsolophus eupatoriella Cham.,
Plutella cruciferarum Zell.,

Gelechia disco-ocellella Cham.
" *roseo-suffusella* Clem.,
Hagno faginella Cham.,
Holocera glandulella Riley,
Bucculatrix pomifoliella Clem.,
Hamadryas Basettella "

Of these ten species, *G. roseo-suffusella*, judging from the number of specimens in the collection, appears to be by far the more numerous, though it may turn out that some of the specimens do not belong to this species, but to a very closely allied and undescribed one; and all the specimens are of a darker hue than those from the Northern States. This species appears to be distributed nearly all over the United States, and is perhaps the most common species of the genus.

G. cercerisella was originally placed by me in *Depressaria*, and I was led to do this by giving too much importance to the neuration of the wings. It is, however, properly referable to *Gelechia*. The specimens—thirteen in number—belong to a very well marked variety. In all the specimens (a great many) that I have heretofore examined, the fore wings are marked just within the middle of the dorsal margin by some faint, short, ochreous streaks, only discernible distinctly under a lens. In these thirteen specimens these ochreous streaks are not present, and their place is occupied by a larger snow white spot, like those on the margins of the wings.

G. æquæpulvella is well represented in the collection, but there appears to be some variation in the shade of the ground color and in the density of the dusting.

The single specimen of *Holocera glandulella* differs from Mr. Riley's description as follows: there is a single discal spot behind the angulated line, and two others at the end of the cell, instead of "two discal spots," as stated by Mr. Riley; besides, "three tolerably distinct, dusky marks around the discal spots" are wanting. Unfortunately I have now no typical specimens of this species, with which to compare it, but I doubt not it is the same.

Hamadryas Bassettella was described by Dr. Clemens from specimens sent to him from Connecticut. He states that it appears to be congeneric with a portion of *Gelechia*. The remark is applicable to almost every species of the family *Gelechidæ*. Dr. C. does not seem to have observed its very close relationship to *Dasycera*, nor, perhaps, its still closer relationship to, or even identity with the genus *Pancalia*. The antennae in *Bassettella* are stout, and the ciliation is microscopic, quite distinct in this respect from species of *Dasycera*. The wings of *Bassettella* are narrower

and the form of the secondaries is different, approaching that of *Butalis*. Mr. Stainton's figure (Ins. Brit., v. 3) represents the secondaries of *D. sulphurella* narrower and more pointed than are those of *D. Newmanella*, but less so than those of *Bassettella*. The ornamentation of *D. Newmanella* resembles that of most species of *Butalis*. The ornamentation of *Bassettella* rather resembles that of *Pancalia*, to which, also, I think, it makes the nearest approach structurally.

Hagno faginella seems to have the transverse dusky lines of the primaries darker and more distinct than in the Kentucky specimens, and those about the middle of the wing condensed into two indistinct fascia.

Plutella cruciferarum presents nothing unusual; but there is in the collection a single specimen which I incline to consider an undescribed species. In it the lighter color of the inner margin projects into the darker part of the wing only once, and that very faintly, behind the middle of the wing; otherwise the line between the two colors is nearly straight; the markings in the posterior portion of the costal half of the wings also differ somewhat from those of *P. cruciferarum*. But the specimen is imperfect, and I shall not at present separate it from *cruciferarum*. From an examination of my collection of *cruciferarum*, I concur with Mr. Stainton's suggestion that *P. mollipedella* Clem. is the female of *P. cruciferarum*.

The new species are as follows:

AMADRIA? Clem.

A. Clemensella. N. sp.

Yellow; the palpi are a little paler, except the outer surface of the second joint. Primaries with minute brown spots arranged in transverse rows; these require close observation: one spot on the fold and one on the end of the disc, a little larger than the others. *Al. ex.* ½ inch. There is also a row of small fuscous spots around the base of the ciliae.

TINEA.

T. obscurostrigella. N. sp.

Dark fuscous; the primaries obscurely mottled with sordid yellowish; there is a row of indistinct yellowish spots or streaks on the costa, from the middle to the tip, and along the base of the dorsal ciliae. *Al. ex.* $\frac{13}{16}$ inch. Season, October.

ANESYCHIA.

A. multipunctella. N. sp.

Second joint of the palpi dark brown, tipped beneath with scattered white scales, and with a few scattered white scales above; third joint white, tipped beneath at the base with dark brown; face black; vertex white, with a central black spot; antennae fuscous; thorax white, with six black spots, one of which is placed close to the base of the wings and is continuous with the dark brown of the wings; two others on top, and one on each side a little before the tip. Primaries shining dark brown or black, with a wide white streak extending along the dorsal margin from the base nearly to the tip, and a white costal spot close to the tip; there is a sinus, or projection of the white into the dark brown portion, just before the middle, and from thence to the tip the line between the two colors is irregular, with another sinus behind the middle; there is a small black spot in the white at the first sinus, and six others along the dorso-apical margin at the base of the ciliae, and another in the costal white spot, or more properly, perhaps, there are three in the costal white spot, two of them being confluent with the dark brown color around it: ciliae white, except at the tip. *Al. ex.* $\frac{13}{16}$ inch. Season, April and May. In nine specimens I detect no variation.

A. minutella. N. sp.

Palpi pale yellowish ochreous; the second joint has two brown spots on its outer surface, that nearest to the base being largest; the third joint has the base and tip dark brown. Head pale yellowish or nearly white; antennae pale fuscous; thorax pale yellowish ochreous, with four brown spots, two of which are about the middle and one on each side near the tip. Primaries white, faintly tinged with ochreous yellow, and with a rather wide golden brown basal streak, which begins near the costa and diverges thence to the end of the cell, and from thence narrows and becomes more diffuse towards the apex, which it does not quite attain. The costal whitish portion is more streaked and suffused with ochreous than the dorsal portion, which has a small brown spot before the middle; there is likewise a row of small brown spots around the apex, at the base of the ciliae. *Al. ex.* $\frac{11}{16}$ inch. Season, April and May.

I have not examined the neuration, and the ornamentation is unusual in the genus; but the other characters are those of *Anesychia.*

HARPALYCE, *gen. nov.*

In the neuration, and more decidedly in the form of the secondaries, this genus makes a very near approach to the *Tortricidæ*. The hind wings are as wide as in any genus of that family. The primaries, however, rather resemble those of the genus *Hagno*, and the palpi also ally it to the *Gelechidæ*.

Wings nearly horizontal (in the dead insect).

In the primaries the costa is regularly arched, and the wing is widest about the middle ; the costa attains the margin behind the middle ; the cell is rather narrow ; the subcostal gives off four branches to the margin before the end of the cell, the first and longest of which arises before the middle, and the last of which arises close to the end of the cell, and reaches the costal margin close to the apex ; the apical branch reaches the apex or the margin close to and beneath it ; the discal vein gives off two branches ; the median gives off, close to the end of the cell, a single branch, which becomes furcate, and the apical branch runs to the margin, parallel to the discal branches ; the fold is thickened at the end, and the submedian vein is long and furcate at the base.

The secondaries are at least one-half wider than the primaries, their width being equal to about two-thirds of the length ; the costa is strongly arched near the base, and *very* faintly sinuate before the apex, which is rounded, and the dorsal margin *very* faintly sinuate beneath it ; the costal vein is sinuate from the margin and almost coincident with the subcostal towards the base, and attains the margin near the apex ; the cell is wide ; the subcostal is furcate behind the cell, with the superior branch delivered to the apex ; the discal vein is curved or angulated, the angle pointing towards the base, and *near* the median it is again angulated, the angle pointing backwards, and a branch proceeds from it to the margin ; the median sends a branch from behind the middle to the margin, and from the origin of the branch bends up to its union with the discal, at which it becomes furcate. Submedian and internal veins distinct. In one of the species (*canusella*) the costa is not so much arched, and the posterior margin not at all sinuate beneath the apex, and the discal vein is curved (not angulated) and unites with the median without forming a second angle, what I have described as the discal branch vein, being continuous with the median and arising from a common origin with the furcate branch.

Tongue rather short; maxillary palpi minute; labial palpi simple, *slender*, slightly overarching the vertex, the third joint about half as long as the second, and pointed; antennae simple, more than half as long as the primaries, with the basal joint short and a little enlarged; scales of the posterior portion of the vertex a little roughened, but not forming a tuft; eyes globose, of moderate size; ocelli, none.

H. tortricella. N. sp.

Yellowish or straw color; head and hind wings paler, nearly white; there is a minute, pale brownish spot at the end of the disc. *Al. ex.* ¾ inch. Season, May.

H. albella. N. sp.

White; a minute, indistinct, ochreous spot at the end of the disc, on the forewings, and a very few widely scattered dark brown scales. There is a brownish, ochreous streak on the outer surface of the second joint of the palpi. *Al, ex.* 1⅛ inch. Season, June, July and August.

H. canusella. N. sp.

Pale grayish, almost white, with obscure patches of very pale fuscous on the primaries; a small brown spot within the dorsal margin, before the middle; another a little behind it on the fold, and another at the end of the disc. At the beginning of the ciliae is an obscure, narrow, curved, pale fascia, which is very concave towards the base of the wing. *Al. ex.* $\frac{9}{16}$ inch.

GELECHIA.

G. thoracealbella. N. sp.

Second joint of the palpi brush-like, the brush spreading and faintly divided; third joint slender, more than half as long as the second.

Palpi whitish, the second joint ochreous brown at the base, and the scales of the brush tipped with ochreous yellow; face, head, and a wide streak from the head to the apex of the thorax, white. Antennae, sides of thorax over the wings, and the primaries brown, the primaries very faintly streaked with whitish towards the apex. *Al. ex.* $\frac{9}{16}$ inch.

G. minimaculella. N. sp.

Second joint of palpi brush-like; third more than half as long as the second.

Head and palpi ochreous yellow; palpi with the base of the second joint, a spot on its outer surface, near the tip, and a ring around the third joint, near the tip, dark brown: antennae dark brown: thorax brownish ochreous above, except the sides just above the wings, which are dark brown like the primaries, and, like them, faintly tinged in some lights with a bluish cast. Near the base of the primaries, extending from the costa to the fold, is a narrow, irregular, interrupted, somewhat oblique ochreous yellow line or series of small spots; there are three or four minute ochreous yellow spots on the disc, and a spot of the same hue about the beginning of the dorsal ciliae, and an opposite costal one. *Al. ex.* ¾ inch.

G. ochreosuffusella. N. sp.

Second joint of the palpi brush-like; third joint about half as long as the second.

Insect dark brown; second joint of the palpi above sprinkled with white or pale yellow scales: third joint ochreous or yellowish, except at the base and a narrow annulus before the middle, which are dark brown; head ochreous, densely dusted with dark brown, so as almost to obscure the ground color; thorax, base of the wings, and a streak along the fold suffused with reddish ochreous; primaries sparsely dusted with whitish and with a reddish ochreous streak at the base near the costa, as well as that on the fold, and with the costal and dorsal spots faintly indicated. The white dusting of the primaries is sometimes very distinct, and it forms an interrupted fascia or rather a line of small specks across the wing, just before the ciliae. *Al. ex.* ¾ inch.

G. depresso-strigella. N. sp.

Second joint of the palpi brush-like; third joint about half as long as the second.

Brown, with a grayish ochreous tinge, the wings streaked with ochreous and the palpi sprinkled with whitish scales. Thorax, basal portion of the wings, and a streak along the fold suffused with reddish ochreous; four very indistinct, oblique, dark brown lines extend along the disc, and the spaces between the veins in the apical part of the wing are each marked with a similar line, and all of these lines appear to be depressed or sunken below the general surface of the wing. *Al. ex.* ¾ inch. Season, July, August and September. It resembles the preceding species, but the

brush is smaller, color of the head and palpi different, and the narrow longitudinal depressed brown lines separate it from that species.

G. pallidagriscella. N. sp.

Second joint of the palpi brush-like: third joint about half as long as the second.

Palpi and head whitish, almost hoary. Pale yellowish gray, a little suffused with ochreous on the thorax and primaries. There is a minute rust red spot about the middle of the disc; extreme costa dark brown at the base; antennae dark brown. *Al. ex.* 3/4 inch.

G. quadrimaculella. N. sp.

Third joint of palpi longer than the second; palpi not at all brush-like.

Dark brown, in some lights tinged with ash gray; a small dark brown spot on the fold within the basal fourth of the primaries; another also on the fold about the middle; another near it, about the middle of the disc, and another at the end of it. *Al. ex.* 5/8 inch. Season, May. The brown spots are very indistinct, differing but little from the general hue.

G. Wacoella. N. sp.

Second joint of palpi with a small brush; third about as long as the second.

Ochreous, sprinkled above with dark brown; third joint dark brown; head and thorax dark brown, with a faint ochreous tinge. Primaries dark brown; two ochreous spots on the costal margin near the base, another at the beginning of the ciliae, and two small spots of the same hue on the fold before the middle. *Al. ex.* 9/16 inch.

G. crescentifasciella. N. sp.

Palpi not brush-like; third joint about as long as second.

Ash gray, microscopically dusted with brown; there is a crescentic, very indistinct pale fascia at the beginning of the ciliae, very concave towards the base of the wing; one or two minute dark spots on the disc, and one at its apex. *Al. ex.* 1/2 inch. Season, April and May. It resembles *G. quadrimaculella*, but is smaller and of a more ashen hue. Sometimes the fascia is absent.

G. pullusella. N. sp.

Palpi slender, simple: third joint more than half as long as the second.

Brown, microscopically sprinkled obscurely with whitish scales. *Al. ex.* $\frac{7}{16}$ inch. Season, August.

G. plutella. N. sp.

Palpi simple, slender; third joint more than half as long as the second, and pointed.

Face and palpi white; vertex pale yellowish, with a dusky central spot; antennae pale yellowish; patagia and costal half of the primaries, almost to the tip, creamy white; thorax and dorsal half of primaries and the tip dark brown; the whitish portion of the primaries is widest at the base, and the dark brown portion at the apex, and the whitish part sends two short, oblique projections into the brown one just before the middle and the other just behind it. *Al. ex.* ½ inch. Season, August.

The ornamentation of the wings bears considerable resemblance to that of *Plutella cruciferarum*, except that the colors are reversed.

G. sella. N. sp.

Second joint of the palpi thickened beneath towards the tip, but not at all brush-like; third joint more than half as long as the second.

Head yellowish white, sometimes with a wide longitudinal brownish streak on the vertex. Palpi very pale yellowish, with the second joint externally brown and internally streaked or sprinkled with brown, and the third joint, with the tip and a band around the middle, dark brown. Thorax and primaries pale ochreous gray; under the microscope pale ochreous yellow, somewhat dusted with fuscous. There is a velvety dark brown spot on the fold, not far from the base, behind which is usually a dark brown dorsal streak, extending more than half across the wing, perpendicular to the margin, placed before the middle, but sometimes it is represented only by a triangular spot on the fold, and which does not touch the margin; and there is another small spot of the same hue at the end of the cell, and surrounded by a paler annulus; base of the costal margin and six or seven small spots along the costa dark brown, the last of which is just before the ciliae; and there is a narrow ochreous basal streak just within the costal margin; occasionally the spots along the costa are absent. *Al. ex.* ½ inch. Season, July and September. It is a handsome species.

G. trimaculella. N. sp.

Second joint of the palpi scarcely thickened beneath; third half as long as the second; acuminate.

Head, antennae and palpi pale yellowish white; third joint of the palpi tinged with fuscous. Thorax and primaries very pale ochreous yellow (under the lens sparsely and minutely dusted with pale reddish ochreous scales); two small, nearly circular, blackish spots before the middle, one beneath the fold, the second on the disc, a little behind the first one; and a larger one of the same hue at the end of the disc, and a row of minute, dark brown spots around the base of the ciliae. *Al. ex.* ½ inch. Season, April and May.

G. elegantella. N. sp.

Second joint of palpi scarcely thickened beneath; third more than half as long as second.

Palpi white; second joint yellowish towards the tip, the third with three brown annulations, one at the base, one before the middle, and one before the tip, sometimes connected by a line along the under surface; head and thorax sordid white or yellowish, slightly iridescent: base of the primaries white, iridescent, narrow, but wider on the dorsal than on the costal margin; this is followed by an oblique, ochreous or yellowish orange band, which crosses the wing and is margined with brown before and behind, and followed by an oblique white band, which also crosses the wing, and is rather widely margined behind by an iridescent, brown line, terminating at a *smooth* tuft of raised scales on the dorsal margin, the tuft or rather smooth elevation being metallic and highly iridescent, as also are the brown margins of the ochreous bands: the dark brown, posterior margin of the second brown fascia is produced backwards along the disc and passes backwards along the disc, inclining towards, but not reaching the base of the dorsal ciliae, and containing three smooth, metallic elevations, like the one on the dorsal margin, the wing between it and the costa being white, and between it and the dorsal margin the wing is white and pale ochreous. The oblique streak terminates just before the dorsal ciliae at a curved fascia, which is very convex towards the base, is reddish ochreous on the dorsal margin, and brown on the costal margin. This curved fascia is followed by an oblique one, which is nearest to the tip on the costal margin, and the costal portion of it is wide and white, and the dorsal portion brown, and in some lights is brilliant metallic; the brown portion is narrow where it meets the white costal portion, and passes

around behind it to the costal margin, and thence curves as a narrow line backwards around the apex at the base of the ciliae, returning to its origin on the dorsal margin, thus enclosing an oblong, egg-yellow or golden patch, parallel with the base of the dorsal ciliae. In some lights this fascia is dull brown, not at all metallic, and the yellowish ochreous parts of the wing become almost brick red; and, in truth, all the colors of the wing, except the dark velvety brown streak which passes obliquely the disc, are so variable that it is very difficult to give an adequate or intelligible description of the insect. The ciliae are fuscous. *Al. ex.* ⅜ inch. Season, May, August and September. I have also received it from Miss Murtfeldt, from St. Louis.

This species belongs to the same group with *G. rosco-suffusella*, &c., and is the prettiest *Gelechia* that I have seen.

G. rufusella. N. sp.

Second joint of the palpi somewhat thickened beneath before the apex (nearly as in the European G. populella); third joint a little longer than the second.

Palpi white; second joint externally dark brown at the base. Head, thorax and base of the primaries yellowish white, with a faint reddish tinge, which gradually deepens and becomes more distinct as it passes backwards over the wings, and about the basal one-fourth becomes bright brick red, and continuing to deepen, becomes tinged with fuscous at the apex. Antennae brown, annulate with pale yellow. *Al. ex.* ½ inch. Sometimes the primaries are sparsely dusted with brown. Season, September.

G. costa-rufoella. N. sp.

Second joint of the palpi clavate, not brush-like, brown, tipped with yellowish; third joint pale yellowish. Antennae brown; head, thorax, base of the primaries, and costal margin to beyond the middle, rufous; the remainder of the primaries brown, with four small yellow spots, two of which are on the fold, and two on the disc, and a fifth small one at the beginning of the costal ciliae; ciliae brown, pale at their base. *Al. ex.* a little over ½ inch. Season, September.

G. subruberella. N. sp.

Labial palpi, with the second joint of the palpi, a little thickened before the tip, as in rufusella.

Pale ochreous, faintly tinged with rufous, streaked and blotched with brick red along the base of the dorsal ciliae; a minute rufous spot on the fold, and a circular brown one at the end of the disc, with a small one before it. *Al. ex.* ½ inch. Season, October. Very near to *rufusella*, perhaps a variety. The palpi are precisely as in that species as to form and colors, but the general hue is much paler.

G. maculimarginella. N. sp.

Second joint of the palpi a little brush-like, yellowish, dusted with dark brown: third joint dark brown, with extreme tip and a few scattered scales white: about as long as the second. Antennae dark brown; head pale ochreous yellow and brown; thorax and primaries dark gray brown, spotted with darker colors; one of the spots is on the costa near the base, and there is a small yellowish spot before it and another behind it, and beyond that is another of the dark spots; there is a dark spot on the fold, with a small yellowish one before it; a small dark spot about the centre of the disc, without any yellow spot before it, and about the end of the disc is another dark spot, with a small yellow one before it. There is a pale yellowish streak at the beginning of the costal ciliae, and an opposite dorsal one. *Al. ex.* ½ inch. Season, July.

G. argenti-albella. N. sp.

Second joint of the palpi scarcely thickened beneath: the third more than half the length of second.

Silvery white; each joint of the palpi has a dark brown annulus before the tip; there are a few blackish scales over the base of the antennae, which are annulate with brown: a small dark brown spot on the extreme costa at the base, followed by three others within the margin, and there is also a small one within the dorsal margin near the base; there is a transverse brown spot or line on the fold, and another at the end of the disc, a brownish fascia at the beginning of the ciliae, and a brownish golden streak around the apex at the base of the ciliae. *Al. ex.* $\frac{1}{3}$ inch. Season, June. A rather pretty and distinctly marked species, like *G. variiella*, but I think it is quite distinct from it.

G. bidiscomaculella. N. sp.

Pale ochreous, becoming a little deeper towards the apex of the primaries; there is a small brown spot about the middle of the disc,

another at its end, and a brown streak along the base of the costal ciliae. *Al. ex.* ⅜ inch. Season, July. I have but a single specimen, and in it the palpi are missing. Allied to *subruberella;* perhaps a variety of it.

G. subalbusella. N. sp.

Second joint of the palpi not thickened.

Creamy white, sparsely dusted with ochreous yellow and brown. *Al. ex.* ⅜ inch. Season, July.

G. parvipulvella. N. sp.

Palpi simple.

Pale yellowish white, lightly dusted with fuscous, the dusting more dense towards the apex of the primaries. *Al. ex.* ⅜ inch. Season, May and August. Possibly a variety of *G. subalbusella.*

G. lavernella. N. sp.

Second joint of the palpi a little thickened beneath towards the apex; third joint rather thick.

Palpi ochreous, with the basal half of the second joint and a band before its tip, dark brown; an annulus before the middle of the third joint, and another wide one before its tip, dark brown. Thorax and primaries gray; base of the costal margin dark brown, and from it a narrow, oblique, dark brown streak crosses the wing to the dorsal margin, in its course crossing almost at right angles an indistinct brown line which proceeds from a brown spot on the costal margin, and passes obliquely forwards nearly to the base of the wing; and at the intersection of the lines the brown color spreads around them, forming another spot; these lines are irregular, and in some parts indistinct; behind these lines the wing is densely dusted with fuscous to the tip, and a brown fascia is well indicated at the beginning of the ciliae. *Al. ex.* ½ inch. There is something in the clumsy looking palpi and general appearance which reminds one of a *Laverna.*

G. cilialineella. N. sp.

Only microscopically distinguishable from *G. solaniella.* Ochreous, tinged slightly with grayish; there is an indistinct brownish spot on the fold, and another a little behind it on the disc, and another in the apical part of the wing. Costal ciliae whitish, *and a narrow, indistinct, white*

line at their base, and one also at the base of the dorsal ciliæ, and three dark brown hinder marginal lines in the apical ciliæ. Al. ex. ½ inch.

G. minimella. N. sp.

Palpi simple.

Insect dark brown, indistinctly sprinkled with white. *Al. ex.* ⅜ inch. The neuration is nearly that of *Cleodora*.

ANARSIA.

A. suffusella. N. sp.

Ochreous yellow, somewhat suffused with fuscous. Outer surface of the second joint of the palpi dark brown, tipped with ochreous; third joint pale yellowish. The third joint of the palpi is more slender than in *A. pruniella* Clem., and the fascia is narrower. *Al. ex.* ¾ inch. Season April.

A. trimaculella. N. sp.

Outer surface of the second joint of the palpi dark brown, except at the apex of the tuft, where it is whitish; third joint yellowish. Head pale ochreous; head and thorax pale ochreous, densely dusted with fuscous. Primaries ochreous, suffused and dusted with brown: a small dark brown spot on the fold before the middle; one a little larger at the middle of the disc, and one at its end, and some scattered dark brown scales along the base of the dorsal ciliae, near the apex. *Al. ex.* scarcely ½ inch.

NEDA, *gen. nov.*

This genus is between *Anarsia* and *Cleodora*. It is an *Anarsia* in all but the hind wings, which are those of *Cleodora*, both in form and neuration.

Head smooth, convex; ocelli, none; antennae minutely denticulate; tongue moderate, scaled; labial palpi moderate, second joint with a projecting tuft at the apex; third joint smooth, ascending in the ♀ (all my specimens are ♀.) Primaries lanceolate, ciliae moderate; the costal vein attains the margin before the middle; the cell is narrow and pointed; the first branch of the subcostal is given off before the middle, and there are two other branches towards the end of the cell; the apical branch is

furcate on the costa before the tip, and has almost a common origin with the apical branch of the median at the end of the cell; the median has three branches behind the middle, and the submedian is furcate at the base. The secondaries are pointed, scarcely as wide as the primaries, with the dorsal margin deeply excavated beneath the tip: the costal margin is excavated from the basal third to the tip: the costal vein attains the margin about the middle; the subcostal is straight to the end of the cell, and thence bends a little upwards to the apex; the cell is very wide; the discal vein oblique, with two branches to the dorsal margin, the upper branch arising close to the subcostal, and the second continued faintly through the cell to the base; the median is trifurcate behind the middle, the first branch remote from the others: the submedian distinct; internal obsolete.

N. plutella.

Third joint of palpi and upper surface of the second one creamy white, the second otherwise dark gray brown; head, thorax and the dorsal margin of the primaries to a point beyond the beginning of the ciliae, creamy white, the primaries otherwise dark gray brown, except that the *extreme* costa is creamy white and the costal margin is obscurely streaked with the same hue. Ciliae of primaries creamy white, except at the apex. *Al. ex.* $\frac{7}{16}$ inch. Season, September. The ornamentation reminds one of a *Plutella.*

CLEODORA.

(No species of this genus has heretofore been described from the U. S. or Canada.)

C. pallidastrigella. N. sp.

Palpi pale yellowish; a spot on top of the third joint, and the brush on the second joint reddish ochreous. Thorax and primaries pale orange; paler, nearly white, along the dorsal margin, and on the extreme costa beyond the middle; a narrow, indistinct, whitish line along the fold, ending at a small brown spot; there is an oblique, narrow, whitish streak along the base of the costal ciliae, continuous with the white of the extreme costa, and there is a short one along the base of the dorsal ciliae: a minute brownish spot surrounded by a pale ring at the end of the disc, and an oblique brownish streak in the ciliae at the apex. The brown spots are all indistinct. *Al ex.* $\frac{3}{8}$ inch.

The neuration of the primaries differs from that of *C. cytisella*, as figured by Mr. Stainton *(Ins. Brit., v. 3)*. by having a branch from the apical vein to the costal margin, just before the vein becomes furcate, and that of the secondaries differs from it by having a single branch from the discal vein, and the subcostal furcate beyond the cell, or rather the superior branch of the discal is united with the subcostal at the cell. Nevertheless, I have no doubt that this species and the following are properly placed in this genus.

C. pallidella. N. sp.

To the naked eye this species appears very pale gray, almost white; under the lens it appears pale ochreous gray, with minute and indistinct pale fuscous specks: there is a fuscous streak along the upper surface of the second joint of the palpi, and the antennae are annulate with fuscous. *Al. ex.* $\frac{3}{8}$ inch. Season, August.

Mr. Stainton, in a foot note on page 111 of his edition of the Clemens papers, doubts whether *Anorthosia* Clem. ought to be separated from *Cleodora*. But the two genera differ decidedly in neuration, and the palpi of *Anorthosia*, as figured by Dr. Clemens, are very different from those of *Cleodora*, as figured by Mr. Stainton *(Ins. Brit., v. 3)*. On the other hand, the palpi of *Anorthosia* resemble more closely those of my genus, *Sagaritis*. In both the tuft rises above the palpal joint, instead of spreading around it, as in *Cleodora*, and in those genera the tuft is composed of long scales, whilst in *Cleodora* it is clothed with stiff, bristle-like scales. In *Anorthosia* the tuft is figured largest at the base of the joint, whilst in *Sagaritis* it is largest towards the apex. The terminal joint in Dr. Clemens' figure is represented shorter relatively to the third than it is in either *Sagaritis* or *Cleodora*. In both these genera the cell is closed in both wings, while in *Anorthosia* it is open. There are also other differences both in the form and neuration of the wings. *Sagaritis* is quite distinct from *Cleodora* in the more elongate and slender body and legs, and more graceful appearance, as well as in the form and neuration of the wings.

NOTHRIS.

N. griseella. N. sp.

Tuft large, but not projecting beyond the end of the joint, its anterior and inferior margins forming almost a right angle with each other; the

terminal joint of the palpi is nearly as long as the second, recurved; tongue rather scantily and roughly scaled at the base, the scales laterally projecting. Having but a single specimen, I have not examined the neuration, but the palpi are nearly those of *N. vecharcella*, as figured in *Ins. Brit., v. 3*, than to any other genus known to me.

Pale gray; basal half of the second joint of the palpi dark brown on the outer surface; tip of third joint dark brown; basal joint and annulations of the stalk of the antennae brown. There is a rather short dark brown line on each side of the thorax above the wings. Primaries with the extreme costa at the base, and the inner angle, dark brown, and the base towards the dorsal margin suffused with faint reddish yellow; the disc from the base nearly to the middle is suffused with brown, and there are faint brownish streaks between the veins in the apical part of the wing. *Al. ex.* ¾ inch.

HOLOCERA.

H. Clemensella. N. sp.

H. chalcofrontella Clem. is so variable a species that it is possible this may be a variety of it; but it is not one of the described varieties.

Whitish, dusted lightly with dark purplish brown, the dusting dense on the second joint of the palpi. There is a purplish brown patch at the base of the costa, a small one about the middle of the costa, a small one opposite to it on the fold, a small one on the disc opposite the space between the other two, one at the end of the disc, and a row of small dots around the apex at the base of the ciliae. *Al. ex.* ⅓ inch. Season August.

POLYHYMNO, *gen. nov.*

The two insects for which I erect this genus are possibly not congeneric. *P. luteostrigella* is a slender, elongate insect, whilst *P. sexstrigella* is rather robust; there is but a single specimen of the latter species, and the head of that is wanting, though it is otherwise perfect. The form and neuration of the secondaries is very nearly the same in both, and so is the form of the primaries, except that those of *sexstrigella* are a little wider. The generic diagnosis is that of *luteostrigella*. The points in which *sexstrigella* differ from it are noticed under that species. The form of *luteostrigella* and the markings of the wings in both species are suggestive

of affinities with *Gracilaria*, especially the short streaks at the apex of the primaries, reminding one of the "hook" in some species of that genus. The palpi are rather suggestive of relation to *Cosmopteryx* or *Stathmopoda*, but the form and neuration of the wings place it beyond doubt in the *Gelechidæ*, though the caudate primaries are peculiar.

No maxillary palpi; labial palpi recurved, very long and slender, with the third joint longer than the second, and pointed; tongue long, scaled at the base; forehead convex; face broad; scales of the head and face appressed; basal joint of the antennae small, scarcely distinguishable from the stalk, which is long and slender.

Primaries lanceolate, narrow, caudate, the costal and dorsal margins both being excised before the tip, behind the cell, the dorsal margin deeply so, and the extreme tip is a little hooked backwards. The costal vein is short, cell narrow; the subcostal gives off two branches, both behind the middle, the first remote from the second, which is at the end of the cell; and the apical branch is furcate behind the cell, both branches going to the costal margin. The discal vein gives off a single branch, which goes to the dorsal margin, and the median is four-branched, all four at or near to the end of the cell; the submedian is furcate at the base.

The secondaries are deeply emarginate beneath the apex, which is a little hooked backwards; the subcostal gives off a long branch from before the middle, and is furcate, with one branch to the costal and the other to the dorsal margin before the tip; the cell is unclosed, and the independent discal branch arises *at* the median, which is three-branched, the first one being before the middle and remote from the others. They are about as wide as the primaries.

The neuration of the secondaries allies this genus to *Trypanisma* Clem., *Taygete*, *Evippe*, &c., Cham.

P. luteostrigella. N. sp.

Silvery white; ciliae pale stramineous; upper surface of the thorax, with four narrow, equidistant, longitudinal, golden yellow lines. Primaries with three similar golden yellow lines extending through the entire length of the wings; one of these is placed just within the dorsal margin, and is continuous with one of the central thoracic lines, but the line is very indistinct, becoming more distinct towards the apex; another of the lines on the wing is continuous with one of the lateral thoracic lines, is very

distinct, becomes furcate on the disc, one branch going to the extreme apex and the other towards the dorsal margin at the beginning of the ciliae, where it becomes confluent with the first mentioned line, but immediately separates from it again, the two lines continuing on parallel to each other around the base of the dorsal ciliae to the apex. The third line begins on the costa at the base, and runs just within the costal margin nearly to the apex, where it becomes confluent with the second or apical branch of the second or median streak. In the apical part of the wing are three golden costal streaks, which become confluent with the second and third longitudinal lines, and point obliquely backwards, the first being rather remote from the other two ; behind these three streaks is a fourth one, perpendicular to the margin ; behind this is a fifth, pointing obliquely forwards, and behind this again two short curved ones, pointing forwards, one at the apex and the other close to and before it. There are two distinct, though small black spots in the dorsal ciliae. *Al. ex.* ⅜ inch. Season, August.

Polyhymno ? sexstrigella. N. sp.

As already stated, the head is missing in the single specimen which I possess of this species, and the primaries are wider, decidedly so in proportion to their length, being a little wider than the secondaries, and the costal margin before the tip is not so decidedly scalloped ; the tip is not hooked backwards ; the apical branch of the subcostal is not furcate ; there are three branches before it, instead of two, as in *luteostrigella*, but the last one has almost a common origin with the apical, and the median is only three-branched, instead of four.

The secondaries are the same, except that in this species the long branch of the subcostal (the first branch) is absent.

The insect is more robust than *luteostrigella.*

Iridescent fuscous, in some lights silvery. About the middle of the primaries is an oblique, wide, silvery white costal streak, of irregular outline, reaching the fold, pointing obliquely backwards, divided in part by a narrow yellowish line, which passes back along the middle of the wing to the second costal streak, the wing above and below it being dark fuscous, somewhat iridescent ; the second costal streak is white and placed behind the middle ; opposite to it is a white spot, just within the dorsal margin ; the second streak is dark margined behind, and the dark margin is produced backwards as a line along the centre of the apical part of the wing, but does not quite reach the apex, and nearly opposite its end are two

small, straight, silvery white costal streaks, both dark margined behind and close to each other; behind these two streaks are two others, also close together, the last one at the apex and both dark margined behind. The apical part of the wing (behind the second costal streak) is golden yellow, sprinkled towards the dorsal margin with brown. Ciliae silvery fuscous, with a wide, dark brown hinder marginal line. *Al. ex.* $\frac{5}{8}$ inch. Season, July.

In the form and neuration of the wings, and in the disposition of the costal streaks it *approaches luteostrigella*; whether it does in the palpi and antennae remains to be seen.

Since the above remarks were written, I have received from Mr. Belfrage more perfect specimens, and find the palpi and antennae as in *luteostrigella*. It may be necessary to amend the specific description a little hereafter.

(To be Continued.)

ON A NEW SPECIES OF CERAMICA.

BY H. K. MORRISON, CAMBRIDGE, MASS.

Ceramica rubefacta (nov. sp.)

Expanse, 41 m. m.; length of body, 20 m. m.

Eyes hairy; collar and thorax reddish brown; the thorax of my only specimen was injured in capture, so that the presence, or if present, the size of the tufts could not be ascertained. But apparently it was tufted, as there are traces of a meta-thoracic elevation. Abdomen yellowish, with a strong basal tuft: the labial and anal tufts tinged with carneous; beneath red; anterior wings deep uniform red; lines obsolete; nervules distinctly black; a white dot on the costa at the base; the interior line is only represented by a white dot on the costa and on the subcostal, median and submedian nervures. The orbicular is blackish, small, oblique and with a grayish centre, situated close to the reniform, and at more than the usual distance from the base; reniform vague and blackish, with a gray

centre ; the exterior line consists of faint white dots on the nervules, and its course is marked by the slightest possible change of color between the median and subterminal spaces ; the ante-apical white dots are very distinct : the subterminal line wanting, except at the costa, where several linear white shades show its place. Posterior wings yellowish white, with a broad fuscous terminal border ; beneath the anterior wings are gray, with traces of an exterior line ; the apical, costal aud terminal regions deeply suffused with carneous. Posterior wings whitish, with the fringe yellow ; the costal and apical portions of the wings carneous. *Hab.* Malden, Mass.; from my collection. Found under bark, June 24, 1873.

In a recent paper, Mr. Grote refers *Ceramica* to *Taeniocampa*, being then only acquainted with *Ceramica picta* Harr. The discovery of this species, which agrees perfectly in structural characters with *picta*, confirms my previous opinion that the genus should be recognized. The characters which separate it from *Taeniocampa* are not very striking, but they can be readily appreciated, and the habits and markings of the two species are very different from any of the *Taeniocampas*. *Rubefacta* approaches to the description of *vindemialis* Guen., but differs in the presence of the orbicular and in other particulars.

In a recent number of the ENTOMOLOGIST Mr. Grote described a species under the title of *Perigrapha normani*. In working on allied genera, we have identified this form, but we are unable to see the propriety of the generic reference.

The following are the characters of Lederer's genus *Perigrapha* :

Eyes hairy; tibiae unarmed ; antennae pectinated in both sexes ; collar cut out and produced in front into a sharp corner : thorax with an angular projection on each side, and bearing behind the collar a lofty, sharp-edged, longitudinal crest ; abdomen with a closely cut tuft on the first segment.

In the species under consideration the antennae in both sexes are simple ; the collar is not produced into a sharp corner ; the thorax is rounded, without angular projections on the sides. Behind the collar there is simply a small, flat, furrowed tuft, instead of a lofty crest ; the abdomen is untufted.

Such being the generic characters of *normani*, we remove it from *Perigrapha* and refer it to a separate section of *Taeniocampa*, as it agrees with the typical species of that genus, except in the possession of a slight prothoracic tuft. The known species will now stand as follows

Taeniocampa Guen.

Section 1.—Thorax untufted.

Alia Guen.

Oviduca Guen.

Pacificata Harvey.

Section 2.—Thorax with a weak, flat, furrowed tuft behind the collar.

Normani Grote.

ON THE SPECIES REFERRED TO ORTHODES BY GUENEE.

BY H. K. MORRISON, CAMBRIDGE, MASS.

In Mr. Grote's recent "List of the Noctuidæ" four of the five species described by Guenée are marked unidentified. With a very large material (nearly 100 specimens of the different species, for many of which we are indebted to Mr. F. C. Bowditch, who has found them common in the vicinity of Boston) before us, we have attempted to straighten out the species and to characterize the two genera to which we refer them.

Mr. Guenée, in instituting this genus, comprised under it many discordant forms, and in his preliminary remarks he forsees the necessity of a future generic separation of the species.

We restrict Orthodes to the group of which *infirma* is the type, and also the most widely known member.

ORTHODES Guen., Noct., vol. 1, p. 371 (1852.)

Imagines of medium size. The eyes hairy; antennæ simple in both sexes; the palpi stout, erect, thickly but evenly clothed; the terminal joint short, but distinctly separated from the other two; the collar rounded, distinctly lobed, and well separated from the thorax; in *infirma* there is an open space between the two lobes. The thorax untufted, its villosity smooth and pressed down; the abdomen untufted, in the female slightly exceeding the posterior wings; in the male long hairy tufts which have their origin at the base of the genitalia, enclose and extend far beyond the parts; the anterior wings rapidly increasing in width from the base outward, triangular, the apex and internal angle rounded. The spots and lines are very clear and evident. Beneath, the males have on the median space an irregular, slightly raised patch of closely compressed hair.

SPECIES.

Infirma, Guen., Noct., 1, p. 375 (1852).

In this species the squamation is smooth ; the lobes of the collar are separated below ; the thorax is concolorous ; the anterior wings are dull purple gray ; the lines and spots are all present, with the exception of the claviform spot, and accompanied by distinct, even, yellow lines ; the half-line parallel with the interior line ; the median lines are trapezoidal ; the median shade is blackish, diffused, and curved, passing between the spots ; the reniform and orbicular are large, contiguous, and surrounded by pale annuli ; a double row of spots on the nervules follow the exterior line ; the subterminal line is distinct, even and slightly curved ; the subterminal space dark, particularly near the costa ; a pale scolloped line at the base of the wings. Beneath yellowish, with a common line ; on the anterior wings the characteristic patch of hair is more elongated and narrower than in the allied species ; on the posterior wings discal dots.

Expanse, 32–35 m. m. *Hab.*, the Eastern and Middle States. I have also received specimens from St. Louis (Prof. C. V. Riley.)

This species is very constant, except that the ordinary spots differ in their closeness to each other. It is extremely common in the Middle States in July ; to the northward it becomes less abundant.

Cynica Guen., Noct., 1, p. 375 (1852).

Nimia Guen., id., p. 76 ; *candens* Guen, id.

♂ . . . . The collar rounded, well separated from the thorax ; there is no open space between its two lobes. It varies greatly in color from light ochreous through all the shades of reddish and purple brown. The thorax concolorous with the anterior wings ; the latter are rounded, proportionately shorter than in *infirma* ; they vary from gray, with scarcely any red admixture, to deep reddish brown. The median lines are always present, simple, black and irregular, accompanied by paler shade lines ; their position in reference to each other varies in different specimens ; in some they are trapezoidal, in others they are almost sub-parallel, and they vary to infinity between these two limits. The median shade is black, diffused and arcuate, always touching the base of the reniform, and approaching more or less near to the exterior line. The ordinary spots are always distinct, concolorous, with white annuli ; they vary in their distance from each other. The orbicular is usually oblique, and but little smaller than the reniform ; in

one specimen, however, it is round and very small. The subterminal line is generally whitish, distinct, and preceded by a dark shade line; this latter is sometimes absent. The posterior wings are uniform, fuscous, slightly lighter at the base, with a faint discal dot; the fringe tinged with ochreous or carneous, or with a shade between them. Beneath the anterior wings are gray, the apex sometimes carneous. The characteristic patch of hair covers the upper part of the basal and median spaces. The posterior wings are yellowish, with a discal dot and thick median line; the latter is rarely obsolete. The fringes of both wings vary; they are usually carneous, but sometimes ochreous or even pale gray. The anal tufts are usually yellowish.

Expanse, 30 to 33 m. m.

♀. In the female the collar is purple, tipped with ochreous; the thorax and anterior wings are never gray, or with any trace of ochreous, neither are they reddish brown, as in the males; they are usually of a dark intense purple brown. The median lines vary as in the males, but they are always less distinct; the ordinary spots are usually present, as in the males, but in one specimen they are barely traceable. The subterminal light line is less distinct, and frequently entirely obsolete. The posterior wings are as in the males; beneath also varying as in the other sex.

Expanse, 29 to 32 m. m. *Hab.* Maine, Mass., N. Y., Ohio; St. Louis, Mo. (Prof. C. V. Riley). Appearing in the latter part of June and first of July.

We have no hesitation in referring *nimia* as a synonym of this species, as specimens from New York exactly correspond with Guenée's description. *Candens*, however, may be distinct; but we are disposed to consider it merely a variety, from the description; at least until it is discovered and proved to be a good species.

PSEUDORTHODES *(nov. gen.)*

Closely allied to Orthodes, but we think sufficiently distinct from it. The anterior wings are narrower than in Orthodes, and lack the distinctive sexual patch of closely compressed hair of the males. The markings are confused, and the ordinary spots are obsolete. The males have not the long anal tufts found in Orthodes. The third palpal joint is longer and better defined.

Vecors Guen., Noct. 1, p. 376 (1852.)

Var. *griseocincta* Harvey, Bull. Buff. Soc. Nat. Sci, 1874.

In this species the thorax is concolorous with the anterior wings ; the abdomen is smooth and flattened ; the wings are usually reddish brown or gray, lustrous ; the median lines are blackish and confused, often accompanied by pale, faint shade lines ; the interior line is slightly oblique and sometimes geminate : the median shade is broad, black, arcuate, and diffused, touching the reniform, which is reduced to a red or white spot. The orbicular and claviform are absent. The exterior line is always simple and denticulate : the subterminal line is faint, light, preceded very frequently by a dark shade, in which are sometimes formed, opposite to the cell, black cuneiform dots. The fringe is concolorous. Posterior wings dark grayish fuscous, sometimes almost black. The discal dot is always present. Beneath the anterior wings are dark gray, with the terminal space usually light ; the posterior wings lighter, with a distinct discal dot. A common median line extends over both wings.

Expanse 25 to 32 m. m. *Hab.* Atlantic States.

Nearly forty specimens were examined from different localities.

O. cynica can be justly called a variable species, but this one is infinite in its variations of size as well as color. We can not consider *griseocincta* other than a specimen in which the reddish tint is entirely absent, and the gray shades accompanying the lines are unusually prominent. The forms of this species slide so gradually into each other that it is impossible to draw distinct lines of demarcation. There are, however, two principal varieties ; in one the reniform is clear, white and conspicuous, and the ground color is reddish ; in the other the reniform is reddish, or indicated only by a few pale scales, and the ground color is gray with but slight reddish admixture. Specimens of this latter variety (which is the only one described by Guenée) sometimes occur in which the ground color is red, but it is more frequently the other way.

In one specimen expanding only 25 m. m., the reniform is white ; the ordinary lines are diffused and black, coloring the whole wing, and entirely obscuring the usual reddish shade. In another, which approaches *griseocincta*, the expanse is 31 m. m. ; the reniform is simply a few collected whitish scales. The lines are nearly obsolete, and the interior line is preceded by a faint pale shade band. The ground color is a dull lustrous slightly brownish gray.

Obituary.

The sad intelligence of the death of that distinguished Entomologist, Francis Walker, of London, England, conveyed in a brief notice in our last, will, we know, have brought grief to the hearts of all those who have been favored with the correspondence of that genial-hearted man. His continued and disinterested kindness towards all those with whom he had to do has endeared him to many. Although we never had the pleasure of a personal acquaintance with the deceased, yet to ourselves personally, as well as to our Society, he has always been among the truest and kindest friends we have had, ever ready to do us any service in his power. His death leaves a void in our circle which it will be hard to fill. The following brief sketch of his career and his unceasing labors, written by one who knew him well, will be read with interest :

It has become my painful duty to record that Francis Walker, the most voluminous and most industrious writer on Entomology this country has ever produced, expired at his residence, Elm Hall, Wanstead, on the 5th of October, 1874, sincerely lamented by all who enjoyed the pleasure and advantage of his friendship. He was the seventh son, and the tenth and youngest child, of Mr. John Walker, a gentleman of independent fortune, residing at Arno's Grove, Southgate, where the subject of this memoir was born on the 31st of July, 1809. Mr. Walker—the father—had a decided taste for science, especially Natural History : he was a fellow of the Royal and Horticultural Societies, and vice-president of the Linnean, so that his son's almost boyish propensity for studies, in which he afterwards became so eminent, seems to have been inherited rather than acquired.

Mr. Walker's decided talent for observing noteworthy facts in Entomology was first exhibited at home, when, as a mere child, his attention was attracted by the butterflies, which, in the fruit season, came to feed on the ripe plums and apricots in his father's gardens ; *Vanessa C-Album* is especially mentioned ; and *Limenitis Sibylla*, another species no longer found in the vicinity of London, was then common at Southgate.

In 1816 Mr. Walker's parents were staying with their family at Geneva, then the centre of a literary *coterie*, in which they met, among other celebrities, Lord Byron, Madame de Stael, and the naturalists De Saussure and Vernet. They spent more than a year at Geneva and Vevey, and in 1818 proceeded to Lucerne, from which place Francis, then a boy nine

years of age, made the ascent of Mont Pilatus, in company with his elder brother Henry; their object, in addition to the ever delightful one of mountain-climbing, being the collecting of butterflies. The family afterwards visited Neuwied, and returned to Arno's Grove in 1820.

In 1830 the two brothers, Henry and Francis, again visited the Continent, and now it was purely an Entomological tour, the late Mr. Curtis, the well-known author of 'British Entomology,' being their companion. This party collected most assiduously in the island of Jersey, and afterwards at Fontainebleau, Montpellier, Lyons, Nantes, Vaucluse, &c., the French Satyridæ, of which they formed very fine collections, being their principal object.

Mr. Walker's career as an author commenced in 1832. He contributed to the first number of the 'Entomological Magazine,' the introductory chapter of his 'Monographia Chalciditum,' a work on the minute parasitic Hymenoptera—a tribe of insects which he ever afterwards studied with the most assiduous attention, and one on which he immediately became the leading authority. He was then only twenty-three years of age; but his writings exhibited a depth of research and maturity of judgment which have rarely been excelled, and which abundantly evince the time and talent he had already devoted to these insects. It is worthy of notice that he now descended from the largest and most showy to the smallest and least conspicuous of insects, doubtless feeling that whereas among the magnificent butterflies there was little opportunity for the discovery of novelties, among the Chalcidites everything was new—everything required that minute, patient, and laborious investigation in which he seemed so especially to delight. Only two authors, Dalman and Spinola, had preceded him in devoting their attention to the structure of these atoms of creation; and even these two had described comparatively a very small number of species.

In 1834 Mr. Walker, somewhat reluctantly, consented to undertake the editorial management of the 'Entomological Magazine,' and resigned this office the following year, yet continued a constant contributor to its pages. The same year he visited Lapland, in company with two of our most distinguished botanists; and in this extreme north of Europe, and especially at Alten and Hammerfest, he assiduously collected insects, more particularly the northern Diptera, the Satyridæ among Lepidoptera, and the Chalcididæ amongst Hymenoptera. During this journey we have the first and only notice of his prowess as a sportsman: he shot wild grouse

and ptarmigan; and on one solitary occasion was accessory to the death of a reindeer, but as other rifles besides his own were simultaneously discharged, it is difficult to say whose was the effective bullet. I am glad to be able to record that Mr. Walker declined to give the poor creature the *coup de grâce*, and, for this especial purpose, resigned to another his *couteau de chasse*.

In May, 1840, he married Mary Elizabeth, the eldest daughter of Mr. Ford, of Ellell Hall, near Lancaster, and spent the summer on the Continent, again collecting in Switzerland with his customary assiduity.

In 1848 he explored the Isle of Thanet, the following year the Isle of Wight, and succeeding years, 1850 and 1851, he visited Geneva and Interlachen; and during the former year commenced his great work on Diptera. This formed part of a projected series of works on British insects, to be called 'Insecta Britannica,' a project in which the late Mr. Spence took a deep interest.

During the year 1851 was published the first volume of the 'Diptera.' This work is printed in 8vo., and contained 314 pages; the second volume appeared in 1853, and contained 298 pages; and the third volume in 1856, and contained 352 pages. Thus the entire work comprised nearly 1000 pages of closely-printed descriptions.

Another tour on the Continent occupied a considerable portion of 1857, Mr. Walker visiting Calais, Rouen, Paris, Strasbourg, Baden-Baden, Heidelberg, Wiesbaden, Frankfort, Mayence, Cologne, Brussels, Aix-la-Chapelle, and Antwerp. During the journey he collected in the Black Forest: and this is the only scene of his scientific labours, during the tour, of which I have any intelligence.

The summer of 1860 was devoted to a thorough exploration of the Channel Islands. Dr. Bowerbank was his companion during a portion of the time, and, as a consequence, the sponges of these islands were a main object of research—the Gouliot caves in Sark, so celebrated for their marine productions—were a great attraction to both naturalists.

In 1861 Mr. Walker's excursions were chiefly confined to North Devon; he visited Linton, Clovelly, Ilfracombe, Bideford, and Barnstaple: and now his attention seems to have been again chiefly occupied with Lepidoptera, at the scarcity of which he was greatly disappointed, having expected, from the extensive woods, to have found moths particularly abundant.

In 1863 he toured the English lakes; and, in the spring of 1865, North Wales and Ireland; and in the autumn he again visited Paris, Geneva, Lucerne, Interlachen, and Altdorf, ascending the Righi, Mont Pilatus and the Mürren, and proceeding to Kandersteg, the Oeschinen See, and the Gemmi Pass.

In 1867 we find him again in France and Switzerland, ascending the Col de Voza, and examining the Jardin of the Mer de Glace; thence over the Tête Noir to Martigny, Sion, and the Great St. Bernard; returning by St. Maurice and the Villeneuve to Geneva.

In 1869 he made the tour of the Isle of Man, and returned by Holyhead; in 1870 he paid another visit to Llanberis, as well as to all the more beautiful scenery in North Wales, crossing over to Ireland, and touring that island from south to north; and in 1871 he examined Entomologically the Scilly Islands, and the districts of the Lizard and the Land's End.

In 1872 he turned his attention to Italy, visiting Rome, Piza, Lucca, Florence, Naples, Sorrento, Capri, Milan, and Venice, as well as the Lakes of Como and Maggiore.

And, finally, in the present year, he had again proceeded as far as Aberystwith, on his way to Ireland, when his intention was frustrated by illness, which terminated fatally on the 5th of October. He died in the most perfect peace of body and of mind. For many years Mr. Walker was a member of the Linnean and Entomological Societies of London, but resigned his membership in both some time before the close of his life.

It might be excusable in a man of such incessant bodily activity—so locomotive by inclination, so devoted to the study of Nature in all her aspects, so dilligent a collector of the objects of his favourite study—had he allowed his pen to rest while his hands were engaged in forming and arranging his collections. But this was not the case with Mr. Walker, as his Catalogues of the National Collection abundantly testify. Of the Lepidoptera Heterocera, alone, Mr. Walker catalogued and described upwards of twenty-three thousand species; in addition to which he prepared similar catalogues, although perhaps not to the same extent, of the Diptera, Orthoptera, Homoptera, Neuroptera, and part of the Hymenoptera: such an amount of labour, as is testified by these catalogues, has seldom, if ever, been accomplished by one individual. But this statement by no means represents the whole of his literary labours. He contributed

shorter or longer papers to the Transactions of learned societies, and to the periodicals of the day, especially to the 'Zoologist' and 'Entomologist;' by the indexes of the latter I find he sent thirteen communications to the first volume, three to the second, one to the fourth, thirteen to the fifth, and forty-three to the sixth; during the present year his writings appear in every number. I intended to catalogue these and his other labours, to give some idea of the number of pages, number of species and dates of each: but I can scarcely now venture to look forward to the accomplishment of this labour of love.

A word remains to be spoken of the man apart from the scientific and accomplished naturalist. Throughout my long life I have never met with anyone who possessed more correct, more diversified, or more general information, or who imparted that information to others with greater readiness and kindness; I have never met with any one more unassuming, more utterly unselfish, more uniformly kind and considerate to all with whom he came in contact. It is no ordinary happiness to have enjoyed the friendship of such a man for nearly half a century.—*Edward Newman in The Entomologist.*

CORRESPONDENCE.

ON CIRRŒDIA PAMPINA Guen.

DEAR SIR,—

In the list of the North American Noctuidæ published in the Bulletin of the Buffalo Society of Natural Sciences, we find the familiar name of *Cirrœdia* Guen. replaced by *Atethmia* Hubn. We are unable to see the necessity of this change. *Atethmia* was founded by Hubner in the *Verzeichniss* (1816) on

x crampelina Hb.
ambusta W. V.
subusta Hb.

Guenée, in his "*Essai sur les Noctuèlites*," printed in the Annals of the French Entomological Society for 1839, p. 489, takes out *x crampelina*, which is congeneric with our *pampina* as well as the European *ambusta*, placing it in the genus *Cirrœdia*. In 1852, the same author in the "*Species Général*," vol. 6, p. 12, defines *Athetmia* (which he spells as in the index, not the text of the "*Verzeichniss*"), referring *subusta* as the typical

species, and adding another, *inusta*, to the genus, both of these species being native in South America.

This being the synonymy of the two genera, we would retain *Cirrædia* for our well known form. H. K. Morrison, Cambridge, Mass.

BOOK NOTICES.

Manuscript Notes from my Journal, or Illustrations of Insects, Native and Foreign Diptera, by Townend Glover, Washington, D. C.

We sincerely thank the author of this valuable work for his great kindness in placing us on the list of the favored few among whom the first small edition of forty-five copies of the above work has been distributed. This work is unique in several respects. It is a fac simile of the author's own note book on this family of insects, written by the author himself on prepared paper, then transferred to stone and printed on a lithographic press. The costliness of the paper required for this purpose and the fact that it can only be used on one side, adds much to the expense of issuing this work, which expense has been borne entirely by the author. Such generosity and disinterestedness in the interests of our favorite science is deserving of the highest commendation.

The work is published in quarto form, and opens with three pages of introductory matter, followed by thirteen plates, containing no less than 480 excellent illustrations of Dipterous insects in their various stages, or of parts of these insects, accompanied by suitable explanatory lists of names, &c. The labor on these plates alone, all of which is the work of this pains-taking and laborious Entomologist, is something enormous, and this, to our knowledge, is but a fraction of the work he has accomplished in this department during the past few years. The next 59 pages are occupied by an alphabetical list of the families and genera of Diptera, with synonyms, habitat, food, &c. Then a list of predaceous or parasitic Diptera; vegetable and animal substances inhabited, injured or destroyed by Diptera, &c., &c. A valuable practical portion of the work is the enumeration and description of various remedies which have been suggested to guard against the injuries caused by these insects. Each division of the work throughout is arranged alphabetically and in the most convenient manner, so as to enable the student to refer readily to any portion he may desire.

Notices of other books received will appear in our next.

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